Address in Pathology,

ON

CHEMIOTHERAPY.

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BY

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IT must be a great pleasure and a special honour for all of us to meet here in person on British soil for a scientific purpose, in order to take part in the great work which will be of benefit to the whole world. Are we not here in a country that has produced two men who must be considered among the greatest men of all times—Jenner and Lord Lister? Like a star in the darkness of his age, Jenner's great achievement, which broke the power of such an awful plague as small-pox, still shines with peerless splendour. And on the occasion of the last Congress that was held here we gathered with wondering admiration round Lord Lister, who through his introduction of antiseptics brought about a revolution in surgery which stands alone in the history of the art of healing. Here in England the first example of a modern institute for tropical diseases, a model for all other institutes of this kind, was created under the direction of Sir Patrick Manson. Through Ross's excellent work, Laveran's discovery of the cause of malaria was so far advanced that entirely new lines were opened up for the hygienic struggle against tropical and subtropical diseases. Castellani's proof that a trypanosome causes sleeping sickness, the classical work by Bruce on illnesses caused through trypanosomes, the specific cause of kala-azar (Dum-dum sickness) as proved by Leishman, are all well known to us. The therapeutic influence of atoxyl in trypanosomiasis was first established in the Liverpool Tropical School by Thomas and Breinl, and quite recently Plimmer has brought forward tartar emetic as an effective weapon against protozoan diseases.

The life-work of Almroth Wright is also known to all of us—his work on opsonins and on the prophylactic treatment of typhoid fever, carried out in so practical and excellent a manner. Even these few names, to which I might add many others, show what a high and leading position England has taken and still holds in the fight against infectious diseases. To prevent the spread of and to heal infectious disorders has always been the highest aim of medical ambitions. But a systematic pursuit of this purpose has only been possible in recent times, as through the labours of all civilized nations we have got an insight into the nature of infections, the cause of diseases, the means by which they are transmitted. Through these methods it has been possible to infect animals artificially, and so to obtain material on which to test the drugs in a systematic and rational manner. From the very first beginnings of therapeutics chemiotherapy has, indeed, been in existence, as all the remedies which we employ are chemicals; on the other hand, experimental chemiotherapy could only develop in modern times in a fruitful manner as a result of all this pioneer work. But here also it has been proved that the four most important factors are patience, skill, luck, and, last but not least, money.

Now, gentlemen, I may perhaps take the liberty of giving you an insight into the workshop of chemiotherapeutic research. The whole area is governed by a simple—I might even say natural—principle. If the law is true in chemistry that *Corpora non agunt nisi liquida*, then for chemiotherapy the principle is true that *Corpora non agunt nisi fixata*. When applied to the special case in point this means that parasites are only killed by those materials to which they have a certain relationship, by means of which they are fixed by them. I call such substances "parasitotropic." But I should like immediately to add that there are evident exceptions to this law. Thus, for instance, we are acquainted with a small series of cases in which the apparent therapeutic results are obtained, although the allied substances in question do not possess parasite-destroying qualities. That is the case in the infiltration of the subcutaneous tissues which is caused by a kind of yeast (sporotrichosis). Here Block proved that the clinically highly therapeutic potassium iodide first of all dissolves the cells of the infiltration, whilst the parasites, as such, are not in the first instance attacked.

But, in any case, it is safest and best for the development of chemiotherapy not to build on the basis of exceptional work, but to start with such substances as produce the destruction of the parasites by fixation.

Now it has been assumed in different quarters that some of the more modern remedies are incorrectly regarded as parasiticides, but in reality they are not such. Thus, for example, salvarsan or mercury salts are not intended to act directly on the parasites but indirectly, owing to the fact that they excite the organism to the formation of specific antisubstances. This view is based mainly upon the fact that if one mixes the substances in question, such as, for instance, neo-salvarsan, with certain pathogenic agents—for example, spirochaetes—in test tubes, one cannot perceive any reduction in their mobility after observing them for hours together. From this fact, which was first discovered by Professor Hata, the conclusion has been drawn that salvarsan or neo-salvarsan, as such, did not in any way influence the spirochaetes directly. Now it can very easily be shown that this conclusion is quite incorrect. If, for instance, following Castelli, one suspends the spirochaetes of relapsing fever in indifferent mixtures of serum which do not injure their vitality, and if one fills two small tubes therewith and adds to one of the tubes a very small quantity of salvarsan or neo-salvarsan, and if one then centrifugalizes and next draws off the liquid; if one washes the remaining spirochaetes again in a mixture of serum and again centrifugalizes it; then one obtains in each tube a deposit of spirochaetes which on microscopic examination show an equal degree of mobility. If, however, the spirochaetes obtained in this manner are injected into test mice, then one can very soon convince oneself that the spirilla treated with salvarsan do not infect the animal, whilst the mice vaccinated with the contents of the control tube promptly show signs of infection. This proves that salvarsan or neo-salvarsan, as the case may be, is absorbed by the spirochaetes, and must have damaged them, and that this trace of salvarsan which is so exceedingly minute that it can scarcely be weighed, was sufficient to prevent the multiplication of the parasites in the animal body. By this very simple and easily intelligible experiment, therefore, the direct effect of salvarsan and neo-salvarsan on the spirochaetes, and thereby the principle of fixation, is absolutely proved; so the objection that the effect is indirect and due to antisubstances falls to the ground.

It was necessary, however, to penetrate more deeply into the mechanism of this fixation of remedies. It is only after long-continued efforts that a clear conception has been successfully obtained. In order to make practical progress it appeared necessary not to be satisfied with the primitive idea, but to see in what manner the drugs actually are fixed by the parasites or by the cells, as the case may be. Only by taking a very roundabout way has it been possible to obtain clearness with respect to these complicated relations, and in this connexion it was especially the studies on trypanosomes, particularly the investigation of "drug-fast" strains of germs, which led to quite definite knowledge with regard to the process of fixation. By continued treatment of the experimental mice with certain definite remedies—for example, fuchsin—it was easy to obtain at last a race of trypanosomes which had become immune to these remedies, that is, "drug-fast," immune to fuchsin, in the case mentioned above. There were three particular classes of different remedies which were well suited to this purpose:

1. The class of the arsenic compounds (in the following historical order): Arsenious acid, arsenilic acid (atoxyl), arsenophenylglycin (salvarsan and neo-salvarsan).

2. The class of the so-called azo-dyes (the trypan red, manufactured by Weinberg, with which Shiga and I made experiments, and the trypan blue of Mesnil).

3. Certain basic triphenylmethane dyes (fuchsin, methyl violet, etc.).

When a race of trypanosomes has been rendered immune to fuchsin, then this race is immune to all the allies of fuchsin and methyl violet, but is not immune to the two other classes. In the same way a race immune to arsenic compounds is only immune to such, but not to the two other classes. We see, therefore, that the immunity is of a specific nature, inasmuch as it is limited to a definite class of chemical substances.

It was just this specific character which indicated that it must be a question of purely chemical processes. Earlier studies relating to another subject—that is, those relating to toxins and antitoxins—pointed to the nature of these processes. In connexion with them, it had been shown that the destructive toxins developed their injurious action on the cell by the fact that they are absorbed by certain specific component parts of the cell—side-chains—which I have characterized as "receptors," and that the antisubstances represent nothing else than the cell receptors, produced in excess under the influence of the toxin and thrown off.

For many reasons I had hesitated to transfer these views relating to receptors to chemical bodies at all, and in this connexion it was especially the brilliant investigations by Langley relating to the effects of alkaloids which caused my doubts to disappear and made the existence of chemioreceptors seem probable to me.

From this point of view the phenomena observed in connexion with the "drug-fast" strain of germs can be readily explained experimentally, owing to the fact that the chemioreceptors under the influence of drug-fastness suffer a reduction of their affinity for certain groupings connected with the remedy, which can only be regarded as purely chemical. This reduction in affinity explains in the simplest possible manner why continually increasing quantities of the arsenic compound become necessary for the destruction of a race of arsenic-fast trypanosomes, for example, for the smaller avidity can only be overcome by a corresponding surplus of the arsenic compound, if the quantity necessary for the destruction of the parasites is to be finally fixed.

We therefore come to the conclusion that in the parasites there are present *different specific chemioreceptors*, for instance, the *arseno-receptor*, which fixes the trivalent group of arsenic as such; and the *aceto-receptor*, which fastens to itself the acetic acid group, an *iodine-receptor*, an *orthoamidophenol-receptor*, which conditions the fixation of the salvarsan, and many others in addition. A complete exhaustive knowledge of all the different chemioreceptors of a certain definite parasite is what I should like to characterize as the *therapeutic physiology of the parasite cell*, and this is a *sine qua non* of any successful chemiotherapeutic treatment. I should like to emphasize the fact that many observations indicate that certain chemioreceptors are due to several different kinds of parasites, not to a single one. The knowledge of these is of special practical importance, because remedies which are adjusted to these have a healing influence on a very large series of the most various pathogenic agents. *The larger the number of different chemioreceptors, therefore, which can be demonstrated, the greater is the possibility of a successful chemiotherapy.*

Now if we seek for specific remedies, then the first condition is that they must possess a certain definite grouping, which is chemically allied to one of the chemioreceptors of the parasite. This is only a necessary prior condition of the toxic effect, but in general it is not a sufficient one in itself. Hundreds of substances may fix themselves on a parasite, yet only a few are capable of bringing about its destruction.

In the therapeutically suitable substance, therefore, in addition to the fixing group, which brings about the fixation, and is described as *haptophoric*, there must be another, which as such brings about the destruction, and is to be characterized as the "poisoning" or *toxophoric* group. This representation exactly corresponds to the views which we have long maintained with respect to toxins, in which we distinguish the presence of a haptophoric group which conditions the cell fixation and also the formation of the antitoxins, and a toxophoric group which brings about the injurious action on the cell. In the case of the highly complicated synthetic drugs the assumption will have to be made that the haptophoric group and the toxophoric group are not *directly* connected with one another, but are linked with a chemical molecule in the character of side-chains as separate groups. In this way we come naturally to this, that chemiotherapeutic agents, built up in a complicated manner, may be compared to a poisoned arrow; the fixing group of the drug which anchors itself to the chemioreceptor of the parasite corresponds to the point of the arrow, the binding member is the shaft, and the poisonous group is the poison smeared on the arrow's head. Corresponding to this scheme in the case of salvarsan (dioxydiamidoarsenobenzol) the benzol group would correspond to the shaft, the orthoamidophenol group to the point, and the trivalent arsenic group would correspond to the toxophoric group on the head of the arow.

If we continue this comparison, then the substances which are used for poisoning the arrows are alkaloids and similar substances, which act injuriously on definite vital organs of the body; and so we shall also have to assume that the toxophoric groups of the synthetic drugs poison the protoplasm of the bacterial cell, and this only appears to be possible when a chemical affinity exists between the toxophoric grouping and the constituents of the cell. The circumstance that all the derivatives of arsenic which contain arsenic in the pentavalent form, that is, in the fully saturated form, do not bring about any therapeutic action, but that this only commences when the arsenic atom exists in the unsaturated trivalent condition, certainly points in the same direction. This difference between the saturated and unsaturated arsenic compounds was discovered by the master mind of Bunsen, for in the year 1843, in his comparative studies relating to the non-poisonous cacodylic acid with the pentavalent arsenic, and its poisonous reduction product the cacodyl with the trivalent arsenic, he came to the conclusion that "the cacodylic acid had lost the power to form an attacking point, and at the same time it had lost its effect on the organism." In later times many analogous cases pointing to the increased effectiveness of the unsaturated compounds have become known. The best known example is doubtless the high toxicity of carbon monoxide as compared with the almost indifferent carbon dioxide.

Dyes act as bactericides only when present as dyes, but not when in the form of their colourless products which correspond to the saturated type. *The fact is that all these unsaturated compounds contain unsatisfied avidities which render them capable of making addition compounds with other bodies.*

If, therefore, we poison a spirochaete with salvarsan, then there occur at least two different chemical fixations. First of all, the fixation of the orthoamidophenol group, which primarily fixes the salvarsan to the parasite. It is only in consequence of this fixation that, secondarily, the trivalent arsenic group is given the opportunity of entering into chemical combination with the arseno-receptor of the cell, and so of exerting its toxic effect. The avidity of the arseno-receptor may be so small that it can only react if favouring factors, which from the chemical point of view must be regarded as stereochemical facilitation, come into action.

Examples of such stereochemical facilitations are frequently found in the chemistry of the ortho-condensations, for example. And so the haptophoric group of the arsenic molecule primarily brings the arsenic to the cell, and secondarily brings about its possibility of action.

Now, it is a frequent practice of many uncivilized peoples to smear their arrow-heads with not one kind of poison only, but with two or three totally different kinds, in order to be certain of killing their enemies. And so it also appeared advisable to imitate this otherwise not very praiseworthy procedure against the parasites, and to poison our synthetically poisoned arrows not singly but doubly. In association with Dr. Karrer I succeeded in attaching the compound containing trivalent arsenic (salvarsan, for example) to metals, and so in producing remedies which, used experimentally on animals, show an increased effect.

In the previous remarks I have described the conditions which are necessary if a certain substance is to exert a parasiticidal effect, and indeed must effect such, if it operates directly on certain definite parasites in an aqueous solution, as, for instance, is the case with the ordinary disinfectants. In the manner described above it is easily possible to produce a very large

number of substances which will destroy bacteria and allied substances in aqueous solutions. But, of course, the problem is much more difficult when it is a question of internal disinfection or of the destruction of living parasites within the infected organism. If the problem of sterilizing a room is set before us, then indeed it is easy to do so, owing to the present advancement of science. But the task becomes more difficult when the room is filled up with materials; and when these materials are of such a delicate sensitiveness as living cells, then the difficulty of the problem will be manifest without any further explanation. As a matter of fact, it has proved that substances which even when highly diluted bring about a colossal bactericidal effect in aqueous solutions are totally ineffective in therapeutics properly so called. For it has turned out that, generally speaking, these disinfectants are more or less powerful cell poisons, and seriously injure the organism; they are therefore not only parasitotropic but also organotropic.

Now, it depends exclusively on the relationship between the parasitotropism and organotropism whether a certain disinfectant can be used as a remedy. In Robert Koch's celebrated experiment, in which even the largest doses of sublimate did not produce a trace of therapeutic effect on anthrax infection, it is evident that the parasitotropic effect was reduced to *nil* by the organotropic effect. If the relationship of organotropism to parasitotropism is somewhat more favourable, then one may observe a peculiar phenomenon, consisting in the course of the infection being rendered worse to an extraordinary degree by the remedy, owing to the effect that the parasites increase to a much greater extent than is the case when no disinfecting agent is employed.

This phenomenon, discovered by Hata, is explained by the fact that the ratio of organotropic effect to parasitotropic effect is of such a nature that almost the whole of the poison is absorbed by the organism, but only an infinitesimal quantity by the parasites. According to a fundamental biogenetic principle it is quite a common thing for substances which act destructively in *large* quantities to bring about an *increase in the vital functions* when given in smaller doses. The only substances, therefore, that can be used as therapeutic agents are those in which the ratio between organotropic effect and parasitotropic effect is a favourable one, and that can be easily ascertained by experimental comparison of the *dosis toxica* with the *dosis tolerata*. *The only substances that can be considered therapeutic agents are those of which a fraction of the dosis tolerata is sufficient to bring about therapeutic effects.*

The organotropic effect of drugs is of course to be attributed, according to the views of Langley and myself, to this, that there are in the most various cells of the body and its organs quite different chemioreceptors, exactly in the same manner as we have postulated for the parasites. Apart from the pharmacological effect of the various remedies, this chemical difference of the organs appears clearly in the method of vital colouring.

I will mention here—in order only to indicate a few examples—the intra-vitam staining of the nerve trunks by methyl blue, the staining of the cell granules by neutral red, and the distribution of isamin blue in the so-called pyrrol cells so carefully and excellently investigated by Edwin Goldmann. The pathologico-anatomical findings point also to a chemical divergence on principle. When we see that after the introduction of paraphenylenediamine only the summit of the diaphragm assumes a black colouring; when we see that vinylamine in the case of all kinds of animals isolates and injures the renal papillae and causes them to die; when after the introduction of cyanosin, as Hata and Goldmann have found, certain definite regions in the hair of mice become coloured, and the colouring matter becomes stored to the greatest degree in the milk glands; when a colouring material of the pyronin series in the case of mice brings about a general dropsy amounting to 50–60 per cent. of the body weight without injuring the kidney, a phenomenon that doubtless is only to be referred to an alteration of the vessels of the subcutaneous connective tissue; then all these phenomena can only be explained by the fact that at these particular spots definite chemical unions of a specific nature must take place, and must be referred to the presence of certain definite chemioreceptors.

Now, according to the above views, all these fixations are dependent on the haptophoric grouping of the drugs. It was therefore a matter of great interest to observe how phenylarsenic acid, the mother-substance of the modern arsenic compounds, behaves when various different atomic groups are attached to it. In this connexion it has been found that when we introduce different fixation groups—for example, chlorine, the oxygen group, the hydrocyanic acid group, the sulphuric acid group, the ammonia radical—we can manufacture from a single substance a series of combinations with toxic effects varying fifteen-hundredfold. The combinations which are to the greatest extent free from poison—these are derivatives of sulphuric acid, especially the sulpho-phenylarsenious acid and its salts—are less toxic than sodium chloride. On the other hand there are substances the very smallest quantity of which brings about death. And in this connexion we can see that, according to the nature of the substances, very different organs of the animal's body are injured. Sometimes it is the intestinal tract, and the animals die of profuse diarrhoea; sometimes it is the liver, and the mice—a rare occurrence—become jaundiced, and die of serious alterations in the liver; sometimes the red blood corpuscles become dissolved, and the animals die of severe anaemia. Frequently also the central nervous system becomes injured, and in the case of mice the vestibular nerve of the internal ear. The interference with the equilibrium produced in this way causes the mice constantly to turn in circles, just like the Japanese dancing mice. In the case of human beings the optic nerve is the point of attack for numerous derivatives of phenylarsenious acid. The cases of blindness which have been observed after the use of very large doses of atoxyl, arsacetin, and other drugs, are due to analogous injuries.

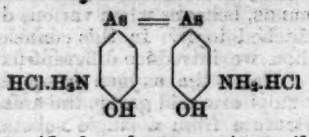
From this it is evident that according to the selection of the group combined with the phenylarsenious acid, quite different organs will be affected. According to the above views this is only explained by the fact that there are, as already previously stated, in the various organs specific chemioreceptors which energetically attract certain fixation groups somewhat as a magnet attracts iron. And this view also provides us with the principle according to which we have to construct our poisoned arrows. We must attach to the phenylarsenious acid group, or, as the case may be, to the phenylarsenobenzol group, such an atomic group as is but distantly related to the organs of the sick body, but on the other hand is chemically very closely allied to the receptors of the parasites.

I have explained above that the parasites possess a whole series of chemioreceptors which are specifically different from one another. Now if we can succeed in discovering among them a grouping which has no analogue in the organs of the body, then we should have the possibility of constructing an ideal remedy by selecting a haptophoric group specially adjusted to the functions of the parasites.

A remedy provided with such a haptophoric group would be entirely innocuous in itself, not being fixed by the organs. It would, however, strike the parasite with full intensity, and in this sense it would correspond to the immune productions, the antisubstances discovered by Behring, that fly in search of the enemy after the manner of the bewitched bullets. Let us hope that it will be possible chemiotherapeutically to hit the bull's eye in this manner also. I do not consider this at all out of the question, as it may be proved in certain diseases—spirillosis in hens, for example—that from the fiftieth to the hundredth part of the *dosis tolerata* of salvarsan entirely frees the animals from the parasites and leads to a cure. Such a dose truly represents a negligible quantity, as the hen cannot be damaged thereby in the slightest degree. But such favourable conditions have only very rarely been discovered up to the present; we shall have to be satisfied if we can succeed in obtaining good therapeutic results with the tenth or even the fifth or sixth portion of the *dosis tolerata*.

In the main the above are the principles which guided us in the construction of the new remedies. Many combinations have been tested in experiments on animals in the case of trypanosomes and spirillar infection. In their preparation I have been supported by the untiring co-operation of Dr. Benda, Dr. Bertheim, Dr. Kahn, and Dr. Karrer, and they have been biologically tested, especially

by my respected friend Professor Dr. Hata, and later by Dr. Castelli and Dr. Gonder and Frl. Leupold. Salvarsan has proved to be the most efficient, the dioxydiamido-arsenobenzol dichlorhydrate of the formula



Here the orthoamidophenol group acts as the conducting and the arsenic group as the toxophoric group.

But now, gentlemen, the step from the laboratory to practice—to the bedside—is an extraordinarily difficult and dangerous one, a step which can only be taken with the greatest care. Its difficulty and danger are in the main based upon two factors:

1. On the fact that in the case of men there exist so-called idiosyncrasies, forms of supersensitiveness which do not occur in the case of animals. So, for instance, it is known that with a large number of thoroughly healthy persons the consumption of harmless articles of food, such as strawberries, crabs, etc., brings about unpleasant skin eruptions, and almost half the known remedies can incite such phenomena of supersensibility. It will not be a cause of surprise, therefore, that such phenomena may occur in a particularly serious form with the employment of therapeutic agencies which contain such powerfully acting radicals as arsenic and mercury. I have already referred above to the disturbances of vision and cases of blindness which have been produced by certain arsenic compounds.

Fortunately, it is proved that such primary supersensibility in the case of salvarsan is one of the very rarest phenomena, and that it was perhaps due to a number of other circumstances, sources of error of a hidden nature, which in many cases have led to the mistaken idea that supersensibility existed. In this place we must first of all mention Wechselmann, McIntosh and Fildes, Hort and Penfold, who have brought forward the very important proof that the destroyed bodies of bacteria which may occur in sterilized water are capable of bringing about a series of serious and unpleasant phenomena such as fever, vomiting, diarrhoea, etc. And even in the case of a pure and unexceptionable water technical mistakes in the manufacture of the salvarsan solutions may bring about injury; too large an addition of alkali injures the veins used for the injection; too small a degree of alkali brings about blood coagulation, and leads to thrombosis; a lengthy shaking of the solutions and standing in the air oxidize the drug to a toxic product, the so-called arsenic oxide, which is much more highly toxic than salvarsan.

2. It has been shown that certain illnesses of a constitutional nature can cause a supersensibility. Thus, for instance, tuberculosis of the suprarenal glands, the so-called Addison's disease, is an illness which, according to the observations of Wechselmann and myself, brings about a severe supersensitiveness of the patients to arsenic compounds. The same applies to the status lymphaticus, which, as has already long been known, must be regarded as a type of the constitutional lack of resistance and supersensitiveness.

Furthermore, the seat and location of the disease may also bring about supersensibility, a supersensibility which is excited by the so-called "local reaction." We are indebted to the master mind of Robert Koch for the first knowledge of this peculiar phenomenon—the well known focal tuberculin reaction. Exactly similar reactions may, however, occur when the parasites are rapidly dissolved in a focus filled with parasites. Then under the influence of the liberated toxin an irritation of the tissues sets in which is connected with hyperaemia and swelling, and which is known in the case of the "luetic" illnesses as "Jarisch-Herxheimer's reaction." Such reactions are, of course, of no great importance when in connexion with the skin; but if the reacting centres have their seat in the neighbourhood of vital organs (brain), then the swelling may perhaps bring about injury of a nature serious to life, or even death itself. Indeed, it is well known that tuberculous meningitis may be influenced in an exceedingly dangerous manner by the careless use of the tuberculin reaction; in spite of this, however, no one will think of attributing the nervous disturbances to a neurotropism of tuberculin. And exactly the same phenomenon may occur with salvarsan if the spirochaetes of syphilis have localized themselves in the central nervous system.

As you will see, the treatment of patients is an exceedingly difficult and responsible task, and the clinical pioneers, such as Schreiber, Wechselmann, Iversen, and others, deserve our warmest thanks. They have thrown the first light upon the most important questions (posology, indications and contraindications). From a series of observations, now so vast that it can hardly be surveyed, there have, however, resulted what I might call the "therapeutic tactics," and which I should here like briefly to explain.

1. The *Therapia sterilisans magna*, which consists in this—that by means of one or at most two injections the body is freed from the parasites. In experiments on animals, and also in the case of a series of important maladies, this principle can be carried through in a clear and pure manner. Here, therefore, the old therapeutic motto is applicable: *Frapper fort et frapper vite.* It is a matter of course that the necessary dose must be greater in proportion to the severity of the disease, for it is absolutely clear that if a definite number of parasites is destroyed by a certain definite dose of the remedy, the quantity must be multiplied if the number of parasites—as happens during the course of the infection—has likewise multiplied. Apart from this, by a rapid destruction of the parasites endotoxins are set at liberty which, with increasing numbers of parasites, reach the circulation of the blood in ever-increasing concentration. And then, frequently at the height of the disease, serious or irreparable pathological disturbances occur, such as suppuration or necrosis, and these, of course, continue even when the pathogenic cause has been destroyed, and may lead to unpleasant complications. I refer here to the typhoid ulcers and to the abscesses and necroses in the case of horse sickness.

Therefore, it is in my opinion necessary to *allow the therapeutic treatment to come into action as early as possible*, as under these circumstances the full success is most easily and most surely attainable. And it is just at the present time when, owing to the progress of diagnosis, and especially the modern assistance rendered by the microscope and serological investigations which are connected with the names of Widal, Rubner, and Wassermann, we are in a position to recognize the specific infections early, that we must select as the first principle of medical treatment, *Frapper vite.*

We shall now have to ask ourselves the question, What are the causes which make it possible for such a favourable result to be obtained, a result which may be taken as *Therapia magna sterilisans*, radical cure of the body by means of a single injection? Typical antibodies can be shown to be produced fairly rapidly by the destruction of parasites, and especially of protozoa. Hence, it is quite evident that this adjuvant action of the organism ought to be eminently efficacious. For if the medicine has destroyed not the whole of the parasites, but only 95 per cent., the remaining 5 per cent. may succumb to the influence of the antibodies which are rapidly formed. If this is the case, the *Therapia sterilisans magna* is attained. Unfortunately, it has been shown that this salutary process may frequently be minimized by the biological properties of the parasites. For it may happen that a number of the parasites which survive the first injection escape destruction by the serum either wholly or in part, and subsequently change into new varieties which have become serum-proof, and are now known as a "relapsing crop." The possibility of forming a relapsing crop largely depends on the nature of the parasites. In the case of spirillosis of fowls, which, as is known, is a disease taking a typical course, relapsing crops do not seem to form, and the chemiotherapeutic cure is therefore an eminently easy one. In cases of recurrent or relapsing fever in human beings, the number of the relapsing crops is restricted to three or four. The number of relapses which we have observed clinically corresponds exactly to the existence of the various relapsing strains. On the other hand, other parasites can exist in an extraordinarily great variety of relapsing strains, and in this connexion I need only mention the trypanosomes and, in particular, the parasite of human syphilis.

In collaboration with Dr. Röhl and Frl. Gulbransen, and lately with Dr. Ritz, I have been able in the case of mice to produce, and to transmit for any length of time, eight entirely different forms of growths. It is clear that with parasites of this kind, which are able to form such a large number of relapsing crops, very great difficulties must occur in the treatment. The auxiliary forces of the body fail to act, so that it is necessary to do one's utmost to destroy the whole of the parasites all at once by means of drugs; owing to its great power of adaptation a single surviving germ may perhaps cause the infection to break out afresh.

Why is it that some of the germs escape disinfection in this way?

If an exactly definable quantity of an antiseptic is added to a liquid containing bacteria, a complete disinfection takes place; not a single germ escapes the destructive influence. But such ideal conditions do not obtain in living organisms. Even in disinfecting a room we sometimes find that in certain places, in the so-called "dead corners" formed by gas or water pipes, and so on, the disinfecting gas does not act sufficiently. In like manner the parasites which have settled in such "dead corners" of the organism are not reached by the drug.

Practical tests, however, have quickly taught us where such "dead corners" are to be found in the organism. The principal one is the hollow situated between the spinal cord and the dura, which is filled with a liquid as clear as water and almost entirely free from cells and albumin, the cerebro-spinal fluid. This condition of the cerebro-spinal fluid can only be accounted for by the fact that the cells by which it is secreted are in a high degree impervious to most of the constituents of the organism, albumin, for example, and that they only permit a limited quantity of substances with small molecules to pass through. The drugs with more complex molecules are thus kept back, as albumin is, and cannot get into the cerebro-spinal fluid. Should, therefore, parasites be lodged here, it is impossible for the drug to attack them. This localization of the parasites is of very special importance in connexion with the parasyphilitic diseases, tabes and paralysis.

Another possible explanation of the defective sterilization is this: that among the large number of parasites there may be some which are unaffected by certain drugs and resist sterilization. On the whole I am of opinion that this fact does not play a very great part in the course of fresh infection, but that it becomes prominent in connexion with those frequently recurring diseases which are characterized by innumerable relapsing outbreaks, such as sleeping sickness, lues, and so forth.

Here two possibilities are conceivable: First, if sleeping sickness, for example, is treated with atoxyl in the usual manner, it is possible—as can be demonstrated easily by experiment—for an atoxyl-proof stock of trypanosomes to develop itself by adaptation.

But, secondly, as I have already mentioned, the mere continual formation of relapsing crops, in the course of time and of several generations, can bring about a change in the chemioreceptors in the parasites. This, according to circumstances, may result in either an increased or a reduced power of resistance in the parasites. For instance, I have found that a trypanosome strain which was not affected by trypan red lost this peculiarity after having passed through a relapsing crop.

We should, of course, expect that certain relapsing crops, especially those showing a great tendency to relapse, should become much less sensitive than the original stock. And the serious influence of the usual specifics, mercury and arsenic, upon parasyphilitic diseases, in connexion with which Noguchi has lately proved the presence of living spirilla, tend to show that this is the case here.

These few facts and considerations suffice to indicate in which cases we may rely upon the result of the chemiotherapeutic treatment being entirely and rapidly successful, and in which cases such a result is to be obtained less easily and only by a circuitous road. The latter is especially the case with chronically recurring disease having localizations not easily reached. If we compare the fight against parasitic diseases with a state of warfare, we find that, on the one hand, great battles are fought which may lead to victory in the course of one or a few days. In combating bacteria such a victory would compare with *Therapia magna sterilisans*. If, on the other hand, a fortress has to be taken, months and even years may be required.

May I be permitted at this juncture briefly to point out the aids which are employed in connexion with a bacteriological siege?

1. When parasites are lodged in a "dead corner" and are in consequence difficult to reach, it has frequently been found advisable to employ, instead of one single injection a long series of injections extending over several weeks, the so-called serial treatment, in accordance with the rule: *Gutta cavat lapidem*. In this connexion I would specially point to the results which Leredde of Paris and Dreyfus of Frankfort have obtained by these means.

2. In this connexion it is desirable to employ a therapeutic agent of as small a molecular volume as possible, such as urotropin, which has been successfully employed by Simon Flexner in cases of infantile paralysis.

3. Moreover, various writers (Touton, Duhot, etc.) have suggested rendering the epithelium of the choroidal plexuses more pervious to the therapeutic agent by means of certain chemicals, thus causing more of the therapeutic agent to get into the cerebro-spinal fluid. Unfortunately this method so far has not led to any tangible results.

4. The possibility of making direct injections into the cerebro-spinal canal, in order to let more of the therapeutic agent get directly to the parasites contained in the fluid has also suggested itself. Thus Ayres Kopke, of Lisbon, has injected suitable disinfectants into the cerebro-spinal canal; Swift and Moore, of the Rockefeller Institute, have quite recently adopted a novel and interesting method in the treatment of tabes which promises to be very valuable. They treat the patient by first injecting salvarsan; shortly afterwards they draw blood from him and inject considerable quantities of the serum obtained from it into the spinal canal. This method is not only novel but suitable in so far as it obviates all possible ill-effects on the sensitive central nervous system by employing serum obtained from the patient himself, while at the same time it is possible to apply the curative agent in sufficient quantities. The results obtained by this method were entirely satisfactory.

It is fairly obvious that all these measures aim on the whole at rendering the places which are not easily approached more accessible for the therapeutic agent than is the case in ordinary conditions. On the other hand, however, the greater power of resistance of certain parasites has to be taken into account, and this is a purely chemical question which can only be solved by chemical means. The road leading to its solution which promises the best results is that of combined therapy.

From what has been said it will be seen that combined therapy is best carried out with therapeutic agents which attack entirely different chemioreceptors in the parasites. For instance, it is useless to combine fuchsin with its nearest relative, methyl violet; and it is useless to combine therapeutically trypan blue and trypan red, for both attack the same spots in the parasites. But it is necessary to select from each group the most effective substance and then to combine the most suitable representatives of the various types. It is clear that in this manner a simultaneous and varied attack is directed on the parasites, in accordance with the military maxim, "March apart but fight combined."

Here the interesting fact has been brought out that, when such combinations are used, summation of the toxic properties of the various substances need not occur so far as the organism is concerned, whilst, so far as concerns the parasite, the therapeutic properties are summated. To quote a case in point, it was found that a sulphito of p-oxyphenylarsenic acid, which is ten times as poisonous as salvarsan, when added to salvarsan up to a certain percentage did not render the mixture more poisonous. But the healing properties of this mixture were three to four times greater than those of salvarsan in the treatment of a trypanosome infection in mice. Such phenomena are quite common in combined therapy. If one injects a mixture, for instance parafuchsin and salvarsan, the colouring matter is stored up by one set of receptors, and finds its way into one set of organs, the salvarsan into another, so that by this method an increase in the toxicity does not take place, provided the components have been

properly selected. In this case $\frac{1}{2} + \frac{1}{2}$ is not equal to 1, so far as concerns affection of the organs, but smaller than 1. On the other hand, both substances are concentrated in the parasites, and their effects can consequently be added, or, in favourable cases, can be multiplied. We thus obtain the therapeutical inequality $\frac{1}{2} + \frac{1}{2} + \frac{1}{2} = 1$.

I have maintained this point for quite a long time, and some very remarkable studies upon the same subject—in which stress is laid on the suitability of multiple, tertiary, and quaternary combinations—have recently appeared from Morgenroth's laboratory.

Moreover, according to more recent experiments, it seems advisable, in all cases where antisubstances are produced, systematically to incorporate these same in the combination, because the antisubstances require a receptor apparatus entirely different from that of the chemioreceptors. Thus the combination of pneumococcal serum with methylhydrocuprein, as tried by Morgenroth, has proved very efficient in connexion with tests on animals executed by Neufeld, while Dr. Bierbaum discovered simultaneously at my institute that exactly the same holds good in connexion with a combination of dysentery serum and salvarsan.

Thus the value of the combinations is clearly shown. They make it possible, always assuming that suitable substances are used, to effect a cure with the smallest possible doses and in the least harmful manner, and to eliminate any danger resulting from a maximum dose of one of the ingredients. A further advantage of combined therapy is this, that under the influence of two different medicaments the danger of rendering the parasites immune to arsenic, naturally a very great obstacle in connexion with further treatment, is apparently minimized. Thus it has been shown that, in the course of a prolonged quinine treatment, it may happen—the cases are fortunately not very frequent—that the malaria parasites become quinine-proof, so that therapeutical doses of quinine are no longer able to destroy the parasites. If, however, such a patient receives an injection of salvarsan, the malaria parasites are destroyed at once, for although they may be quinine-proof, they are not arsenic proof. Should the doses of salvarsan have been too small to prevent a relapse, and provided further doses of quinine are given to the patient when parasites again appear in the blood, a curative effect may be obtained by means of quinine. Consequently the combination of quinine and salvarsan has the effect of neutralizing or minimizing the quinine-proof qualities of the parasites.

For all these reasons I think that combined therapy will in the future conquer an ever-increasing field of action. Thus, for instance, Broden, in the Congo, while treating sleeping sickness in the human subject—it is true only in the early stage of this intractable infection—succeeded in obtaining good results by the combination of salvarsan and two basic colouring matters (trypallavin and tryparosan), the treatment lasting about a week.

It is precisely in the manifold possibilities of combination that I see a special advantage, and peculiar potentialities of development. When once we are acquainted with the majority of the chemioreceptors of a particular kind of parasite—a long piece of work occupying many hands and many heads—we shall have far-reaching possibilities of simultaneous attack by various agencies. And on this account combined therapeutics are characteristically pluralistic in contrast to the antitoxins, which may be said to act rather in one single direction.

And now, gentlemen, may I be permitted to refer to a few practical results? You are all aware that with a number of spirillar diseases the principle of *Therapia sterilisans magna* has proved most successful. You are aware that it is possible by one single injection of salvarsan to cure framboesia (yaws), which is caused by spirochaetes and is a scourge of the tropics, to cure it completely except in rare cases where unimportant relapses occur; this has been shown by the work of Strong, Koch, and Castellani. Thus in Surinam a hospital in which over 300 patients with framboesia were constantly under treatment was closed and turned to other uses after the introduction of the salvarsan treatment, as one single injection sufficed to cure the disease, and all the patients but two could be discharged. It is to be hoped that in this way it will be possible to extirpate framboesia altogether.

Exactly the same favourable results have been attained with relapsing fever in the human subject, the fever immediately subsiding after the injection of salvarsan, and the patients being cured by one injection. The very rare cases of recurrence that occasionally occur are also readily curable.

To continue dealing with salvarsan in syphilis, which is so closely related to framboesia, a fair percentage of cures has been obtained in the very first stage of the disease by a single injection of a large dose, but, of course, the abortive cure by intensive treatment is far more certain.

With Vincent's angina and the diseases of the mucous membrane of the mouth, caused by buccal spirochaetes, *Therapia sterilisans magna* is possible; in fact, in many cases a mere local application of salvarsan suffices. I may here further mention tertian malaria. In this form, but in this form alone, salvarsan has proved successful, as it has in blastomycosis (Petersen) and Aleppo boil. As regards the diseases of animals which can be cured by a single injection of salvarsan, I might specially mention breast disease of horses, which is of such enormous importance to the military authorities, and lymphangitis epizootica, the African glanders in horses.

Most important are the recent observations of Rogers, who found emetine to be a specific against the very serious amoebic dysentery. And if here it is indeed advisable and necessary to repeat the injections, yet the triumph of therapeutics remains unassailed; it is all one to the patient as to whether *Therapia sterilisans magna* or *Therapia sterilisans fractionata* is employed, provided only he is relieved of his sufferings in a harmless manner.

Piroplasmosis also, which causes serious disease in cattle and dogs, may, according to the observations of Nuttall, be favourably influenced by a pigment belonging to the class of trypan-colouring matters—namely, by trypan blue, first made by Mesnil. As I am informed, the fight against this disease has been taken up in a general manner at Pretoria under the auspices of Theiler. The injections are there performed not by veterinary surgeons, but by the farmers themselves, and they are glad to keep their valuable animals free from this serious disease.

It is indeed easy to understand that the schizomycetes, which in themselves are so much hardier than the tender protozoa and spirochaetes, will offer an increased resistance to the attack of drugs. Naturally here, too, there are fine differences, and it is perhaps no accident that the pneumococcus, the protoplasm of which is, of course, most sensitive, should in the course of treatment also have shown itself to be particularly sensitive. (I refer here to the fine researches of Morgenroth in the treatment of laboratory animals, infected with the pneumococcus, by means of derivatives of quinine, especially ethylhydrocuprein.) But in the case of hardier bacteria, too, such as the *Bacillus typhosus*, the possibility of sterilization is not beyond hope. The first successful experiments in this sphere were carried out by Conrad on rabbits and later confirmed and extended by Uhlenhuth and his fellow workers.

If I briefly allude to the very hopeful experiments of Gräfin Linden, who has endeavoured to influence tuberculous infections favourably by means of combinations of copper and lecithin, and if I add that salvarsan also has been shown to have a beneficial action upon the malignant anthrax bacillus, and upon that of glanders and, possibly, upon that of erysipelas, both in animal experiments and occasionally, too, in human cases, then all that we know about the chemiotherapeutics of the specific bacterial diseases has been told, so that it is just in this direction that there lies a wide field still to be worked. This field, important as it is, is still in the very first stages of experimentation.

And if after what has been said we cast a glance over the development of medicine, and especially of the fight against infectious diseases, we must recognize that in the last fifty years the most important advances have been made in every direction, advances connected above all with the names of Pasteur, Robert Koch, and von Behring.

On the one hand, we have the isolation of the pathogenic bacteria, which was made possible really by the Koch method of the solid culture medium, and in which Robert Koch's pupils and fellow workers—Löffler, Gaffky, Pfeiffer—first participated; the study of protozoa, which

started from Laveran's discovery of the germ of malaria; the discovery by Löffler and Frosch, Roux and Nocard, of the viruses which pass through filters; and the recognition of insects as intermediate hosts and transmitters of infectious diseases, connected with the name of Theobald Smith, which has led to the most important consequences.

On the other hand, we have the study of the immunity theory which was first inaugurated so brilliantly by Metchnikoff and received a new impetus from the wonderful discovery of antitoxins by von Behring. A wide new field—that of the science of immunity and the investigation of serums—was opened up, and here Pfeiffer, Bordet, Widal, Wassermann, and many others including myself, have worked with successful result. Some of the most valuable fruits of these labours, from a practical point of view, have been the diagnosis of diseases, first in the form of the Widal-Grüber reaction, and later the Wassermann syphilis reaction, the importance of which for diagnostic and therapeutic value cannot be over-estimated.

All these discoveries, especially in regard to the ways of spreading disease by infecting agents, have, in accordance with the principle that "prevention is better than cure," been made good use of in the fight against epidemics and for prophylactic measures, and have brought about an improvement surpassing expectation. In the second place the struggle with diseases which have already broken out has benefited by these discoveries, the most wonderful example being antidiphtheritic serum.

Epidemics and other diseases are much less dangerous nowadays than they used to be. The efforts of chemiotherapeutics must be directed as far as possible to fill up the gaps left in our defences, more especially to bring healing to diseases in which the natural powers of the organism are insufficient. And I believe that now definite and sure foundations have been laid for the scientific principles and the method of chemiotherapeutics, the way is visible before us—a way not always easy but yet practicable. In the diseases due to protozoa and spirilla extraordinarily favourable results have already been gained, as I have shown. There are many valuable indications that in a series of other diseases—small-pox, scarlatina, typhus exanthematicus, perhaps also yellow fever, and, above all, the infectious diseases caused by invisible germs—the prospects of success are brightening. But in contradistinction to the protozoan disorders the ordinary or common bacterial diseases (diseases due to the streptococcus and staphylococcus, *B. coli*, typhoid and dysentery, and above all tuberculosis) will not be vanquished without a hard struggle. Nevertheless, I look forward with full confidence to this development also, and, without being set down as an optimist, will put forward the view that in the next five years we shall have advances of the highest importance to record in this field of research. There are indeed problems which often prove too great for the powers of individuals, and can only be solved by a many-sided effort. Considering the enormous number of chemical combinations which must be taken into consideration in the struggle with disease, it will always be a caprice of chance or fortune or of intuition that decides which investigator gets into his hands the substances which turn out to be the best for fighting the disease, or who it is that happens on the basal substances for the discovery of such. But the chances in favour of finding a real cure, and so of winning the big prize, will naturally increase with the number of those who occupy themselves with the problem. It is just here that we should unite our forces, and special importance attaches to that motto, *Viribus unitis*, which gives guidance in so many other fields. For this is the noble legend on the flag of this great International Congress, to which thousands have been drawn from all lands to bear testimony to the fact that in the world of science all national barriers have fallen.

THE Government of Ontario having instituted the post of inspector of the feeble-minded has appointed thereto Dr. Helen MacMurchy, a medical woman whose name has long been familiar in connexion with the study of questions relating to infant mortality, and who is personally known to many of her colleagues in this country owing to her attendance at the annual meeting of the Association in 1910. She will also bear the title of inspector of hospitals and public charities, and act in this capacity as assistant to the head of the hospitals department at the Ontario Home Office, Dr. Bruce Smith.

Address
ON
HEREDITY.

DELIVERED AT THE SEVENTEENTH INTERNATIONAL CONGRESS OF MEDICINE.

BY W. BATESON, M.A., F.R.S.

LET me on behalf of my colleagues, the students of genetics, express our deep sense of the honour conferred upon us by the organization of your Congress in choosing our science as the subject of one of the general addresses. It is scarcely necessary that I should say, on my own behalf, that I feel it an extraordinary privilege to be permitted to represent that science on such an occasion.

This is a great privilege, but it entails also a very grave responsibility. Conscious as we are of the exceptional significance that the study of heredity must before long assume, it would be mere affectation were I to suggest any misgiving as to the propriety of allotting to this subject a conspicuous position in your deliberations. To the penetrative foresight of Francis Galton it was evident long ago that these aspects of physiology must one day become one of the chief preoccupations of reflecting minds. That inference he drew from a broad contemplation of the facts of descent. Traces of order among these phenomena he did indeed perceive, and by great labour and ingenuity he even gave numerical expression to his conclusions. But great as his services were in attracting attention to the problem, no one before the rediscovery of Mendel's work had ventured to imagine that the confusion, the paradoxes, the capricious disorder of the phenomena of descent were, in very great measure, capable of a simple and ready analysis. It is this knowledge which has given to genetic science a position paramount among the branches of physiology, showing that in accurate genetic analysis a means is given not merely of elucidating the inter-relations of parent and offspring—the immediate subject of our investigations—but of contributing also to a right interpretation of various special problems of pathology and of anthropology, perhaps, also, to a true understanding of the course of human history, and certainly to the direction and control of the destinies of mankind. Knowing, as I must, that the manner in which these issues are presented to you to-day cannot fail to influence in some measure the development of genetic study in the medical world, I should be insensitive did I not feel how responsible is the position I now occupy. Most of all I fear that I may seem in some degree to exaggerate not the importance of the principles already ascertained, but the precision with which they can be shown to apply in the special cases of human physiology. In all the arts, perhaps most in the art of exposition, the hardest thing is to simplify the presentation by the omission of detail, and at the same time to leave the picture true to natural fact. So let me, therefore, at the outset say that in regard to almost every instance of principle I shall bring before you, though rule may be perceived, we have evidence of exceptions also. This is true even of the rules traced by minute analysis in the plants and animals amenable to experiment, and necessarily far more true of the human phenomena which are brought within our reach for the most part by imperfect records. As in every department of physiological advance, we have first to trace the course of those great sweeping curves which lead to the recognition of ascertained law, and later those minor deviations, perhaps equally significant, which must hereafter be the subject of a further analysis.

Now the essence of Mendelian principle is very easily expressed. It is, first, that in great measure the properties of organisms are due to the presence of distinct, detachable elements, separately transmitted in heredity; and secondly, that the parent cannot pass on to offspring an element—and consequently the corresponding property—which it does not itself possess. The determination or recognition of these elements by analytical breeding is one of the main objects of present-day genetic research. Each germ cell, ovum or sperm, may contain or be devoid of any of these

elements, and since all ordinary animals and plants arise by the union of two germ cells in fertilization, each resulting individual may obviously receive in fertilization similar elements from both parents or from neither. In these cases the offspring is "pure" bred for the *presence* of the character in question, or for its *absence*. But it may be formed by the union of dissimilar germs, one containing the element, the other devoid of it, and in this case we call the individual cross-bred, or heterozygous in that respect.

A population thus consists of three classes of individuals—those pure for the presence, having received two doses, of an element; those pure for the absence of the element, having received none of it; and the cross-breds, which have received one dose only.

From the physiological standpoint it is of great importance to distinguish the positive from the negative characteristic. But since it often happens that the full effect is produced in the organism by one dose only of a character, we have felt justified in regarding this positive effect as the sign or proof that it is caused by something present. A plant, for example, though cross-bred for tallness, may be as tall as one pure-bred for tallness.

Each dwarf plant, whatever be its parentage, can only produce dwarf offspring. Not having tallness, it cannot transmit that property. A cross-bred *tall* plant can, by self-fertilization, produce both tall and dwarf offspring. Fowls with silky feathers cannot, if bred together, have offspring with normal feathers; but two birds, normal to all appearance, can, if they be cross-bred in that respect, produce silky offspring.

At a later stage we will consider to what extent we are justified in thus discriminating between the positive and the negative characters, but for the present we will note that, as a matter of symbolical expression, the distinction is immaterial. Now the organism produces germ cells representing in equal number the several characteristics of the germ cells from which it arose. There is, as we call it, *segregation* between the elements introduced from the parent. The double structure of the soma is, when the germ cells are sound, resolved into the single structures of the germ cells. If the organism is pure-bred in any respect, all its germ cells are alike in that respect. If it is cross-bred, its germ cells represent in equal numbers the positive or negative characters which were brought together in fertilization. In consequence, the numbers of individuals resulting from the various possible forms of union follow regular arithmetical rules, and the proportions in which the several classes appear give us the means of tracing and identifying the various systems of descent.

It was naturally with great interest that we began the examination of human pedigrees, and the result of that search soon showed that many of the more definite hereditary diseases and malformations follow one or other of the systems with which Mendelian analysis has familiarized us. The first condition thus recognized to have a simple Mendelian inheritance was the peculiar malformation known as brachydactyly, described in America by Farabee. Another example is congenital cataract, studied by Nettleship, to whose admirable researches we owe many of our most valuable and instructive pedigrees. Both these conditions descend as dominants. It is characteristic of them that unaffected members of the families do not transmit. Not having in them the critical element which causes the condition, they cannot pass it on to their posterity. In the human examples the individuals affected are almost always heterozygous, and hence among the children which are born to their marriages with normal persons, we expect the affected and unaffected to be in equal numbers.

Since then such pedigrees have been recognized in abundance. The collection of such evidence we owe especially to Nettleship, Gossage, Drinkwater, Lundborg Weil, Bulloch, and many more.

Some of these, which may be stated with fair confidence to descend commonly as dominants, are the following:

Brachydactyly; claw-shaped extremities; cartilaginous exostoses; membranous cranio-cleido-dysostosis; hypoplasia of the teeth; diabetes insipidus; chronic trophoedema (generally).

Skin Affections.—Tylosis, epidermolysis bullosa, telangiectasis, hypotrichosis, porokeratosis, xanthoma.

Ophthalmic Diseases.—Presenile cataract, ectopia lentis (sometimes), coloboma (sometimes), distichiasis, night-blindness (certain forms), retinitis pigmentosa (sometimes).

Nervous Diseases.—Angeio-neurotic oedema, tremor hereditarius, ptosis, Huntingdon's chorea, and probably several of the forms of spastic paralysis and of myatrophy.

Respecting nearly all these it may be remarked that exceptional cases, some undoubtedly authentic, are on record in which affected children have been born to parents actually or apparently normal. Many of these exceptions are undoubtedly genuine and serious, but others may be ascribed to irregularities in the age of incidence, and to mistakes as to slight cases.

Another difficulty arises from the fact that the numbers are frequently irregular. This is in part caused by imperfection in the records. In part, however, I think these aberrations point to real peculiarities in the process of segregation. We know well that in certain plants like wheat and peas the expected numbers appear with great constancy, but in others, as stocks and the primulas, long "runs" are so common that smooth results are only obtained by the summation of large series of observations. We are perhaps right in conceiving the germinal tissue of a heterozygote as an emulsion of the two types, sometimes coarse, sometimes fine, and the degree of smoothness of the results may be an indication of its state in this respect.

In regard to the large group of diseases of nervous origin, such as Friedreich's disease, Thomsen's disease, and others, these sources of difficulty are especially serious; and though from study of many genealogies I have come to the conclusion that most of them are essentially dominants, I offer this opinion with reserve.

Of recessive conditions in man we have less abundant evidence. Inasmuch as they usually appear from the unions of parents both apparently normal, though heterozygous for the condition, their occurrence is rare and sporadic. Lundborg has shown with great probability that paralysis agitans is one of these. The constant intermarriage of families in the valleys of Sweden, Norway, and the Alps gives the best opportunity for the study of this form of descent. Lately, also, the American students of genetics have produced evidence making it clear that feeble-mindedness has at least one of the marked features of a recessive condition. When both parents are feeble-minded they have no normal children. It is nevertheless difficult to regard this condition as a simple recessive, for unions of the feeble-minded with normal persons almost always produce some feeble-minded children. Among our experimental families of plants and animals there are mysterious examples somewhat comparable with those, but the exact nature of the complication is still obscure.

Other conditions which exhibit a behaviour characteristic of recessives are albinism, myoclonus epilepsy, and alkaptonuria. They may all appear in the children of normal persons, with special frequency as the result of marriages of related parents, and there can be no reasonable doubt that these conditions are due to the loss of some factor present in normal persons.

At this stage attention should be called to a remarkable group of cases in which the appearance of abnormality may almost without doubt be regarded as partially dependent on the conditions to which the soma is subjected. Of these, I may mention in particular some of the congenital abnormalities, such as hallux valgus, and some of the congenital deformities of the joints, as, for example, dislocation of the hip or of the radius. In these cases we meet the curious fact that whereas the condition most usually appears in the offspring of normal parents, it may, in certain families, be transmitted from parent to offspring as a dominant. I am inclined to compare these phenomena with those so often witnessed in incubating eggs. When the incubators are not running uniformly, many of the chickens are born with deformed feet. Such abnormality, however, is found with especial frequency in particular strains of birds, though eggs from other strains exposed to the same conditions may give perfectly normal results. The liability is the thing transmitted, but without the appropriate conditions the effect is not produced.

The next group of cases to which I would call your attention is one in which the descent of the abnormality is limited wholly or partially by sex. Of these, the best known examples are those of the descent of colour blindness, haemophilia, and one of the forms of nystagmus.

In regard to colour blindness, the fact has long been known that males are affected with exceptional frequency. Colour blindness among women is decidedly rare. Horner was, I think, the first to call attention to the fact that in

the pedigrees of this condition there is remarkable regularity. Normal women transmit the affection to their sons, whereas colour-blind males with rare exceptions have only normal offspring. It is possible to interpret these phenomena by the suggestion to which several of us inclined some years ago, that colour blindness is a dominant, inasmuch as the normal males cannot transmit it. We were led to regard the condition as due to the presence of something inhibiting normal colour sense rather than to the absence of the factor to which that sense is due. Further investigation has, however, thrown doubt on this simple explanation. As to the descent, however, there is no doubt that the sons of colour-blind males do not inherit the peculiarity, and therefore cannot transmit it. The daughters of colour-blind fathers inherit it, and though it does not appear in them, probably all of them have the power of transmitting it to their sons. Knowledge derived from direct experimental breeding of various animals has provided a very remarkable scheme by which this course of descent can be represented factorially. One of the simplest of such examples is that of the inheritance of colour in Sebright bantams. When a cross is made between a golden hen and a silver cock, all the chickens come silver, but when a reciprocal cross is made, a silver hen being mated with a golden cock, the pullets come golden but the cockerels come silver. In this case we must regard the silver as dependent on the presence of a dominant factor, and the golden as due to its absence. The silver male is purely for silver, SS, having received that factor from both parents, but no pure silver hen exists. The hen is heterozygous for silver, and may be represented as Ss. We must further regard the hen as also heterozygous for femaleness, Ff. In the formation of the eggs there is what we call repulsion between the factor F and the factor S; the two are not present together in any egg. Those eggs which are destined to become males carry factor S, and those eggs which are destined to become females carry factor F. Now in colour blindness, the repulsion that has been so clearly proved between these factors may be represented as acting in the germ cells of the male between the factor for maleness and the factor for colour blindness; such that the sperms destined to become males carry factor M, but do not carry the factor for colour blindness, which passes entirely into those sperms which are destined to produce femaleness. It is evident that females heterozygous for colour blindness are not colour blind, and that colour-blind females can only be produced by the meeting of two germ cells both bearing the affection.

It follows from the hypothesis that the sons of colour-blind women will all be colour blind, and all the records of such families with which I am acquainted, with a single doubtful exception, are in agreement, in that the sons of such women were all colour blind.

It is practically certain that the same system of descent sometimes holds for nystagmus, respecting which Nettleship has recently collected some important genealogies.

As to the other sex-limited conditions in man, I can only say a few words. Haemophilia is the most familiarly known of these. It is likely that the condition in men follows the same descent as that established in the cases of colour blindness, but inasmuch as males affected with the condition very rarely live to the age of puberty, little is known of their powers of transmission.

I have already spoken of night blindness as a condition which descends as a dominant, but it is very interesting that Nettleship has lately published certain pedigrees of night blindness in which the descent is of the sex-limited type. This particular night blindness is apparently associated always with a high degree of myopia, and I suppose there can be little doubt that the recognition of the genetic distinction will lead to the discrimination of pathological differences also. Pseudo-hypertrophic muscular paralysis is another condition which descends in a similar way, and at least one large pedigree has been compiled by Herringham showing the same descent for peroneal atrophy.

At an earlier stage of this lecture I mentioned a doubt as to the justice of the inference that the characteristics which behave as dominants are due to the *presence* of factors, and to that point I must now return. In our experimental studies of animals and plants we are aware that certain negative characteristics may be produced not by the absence of a quality, but by the presence of some factor which inhibits its expression.

In illustration I may show you an example in the Chinese primrose. These plants may have their flowers coloured or white and we are aware that the white may owe their whiteness in certain cases to the absence of colour; in which case, of a cross with the coloured form, the offspring are all coloured, whereas other whites contain something which destroys or inhibits the development of the pigment which is contained in them, and when such whites are crossed with coloured the offspring are white or nearly so.

In view of these examples the question fairly arises whether some of the dominants whose descent I have traced in human pedigrees may not in reality be due to the absence of some factor which in normal persons prevents such development. This suggestion was prominently brought forward by Doncaster in regard to colour blindness. He lately suggested a scheme according to which we should regard all normal males of the population as heterozygous Nn for a factor N normality, and all ordinary females as homozygous NN for the same factor. In either case the course of the descent would, both qualitatively and numerically, be the same as that represented by the earlier scheme. Between these two methods of representation we cannot as yet distinguish. The point is of great importance in another respect. The question will be prominent in most of your minds, whence do these dominant factors come? Whereas it is comparatively easy to conceive some process by which some elements of the composition may be lost, we are quite unable to suggest any source from which a factor may be derived or any mode by which it may be taken into the genetic system of the organism. We have been accustomed to speak of factors as being added to or subtracted from the sum total of an individual composition, but as to the actual origin of new dominants there is very little contemporary evidence.

In the case of those animals, such as the fowl, the wild original of which we think we know, many factors exist in our domesticated breeds which are not possessed by any of the wild species. No wild species, for example, has the complicated combs that we know in our domesticated breeds. None has the dominant white colour of the leghorn, and many other such instances might be given. How have these elements been added to the composition of the fowl? The problem is exactly parallel to that constituted by the occurrence of brachydactyly or night blindness in man. We can only trace back these peculiarities to a single individual of whose origin nothing is known, but whence did he derive the factor to which he owes his peculiarity?

We may compare these cases with those of the origin of an infectious disease, such as typhoid fever. When a medical officer of health recognizes typhoid in his district he knows that it must have come from some definite source of infection, and but for one feature in the descent of dominants we might be tempted to suggest that they also arose through the introduction of some element from without into the system. I see no *a priori* impossibility in such a belief, but in these dominants we know that the distribution among the germ cells is approximately symmetrical, and nothing that we know of animals and plants justifies the suggestion that a foreign element can be so treated in gametogenesis. Perverse as such a suggestion may appear, I do not think we should close our minds to the possibility that these dominants arise by a process of loss of some inhibiting factor. Until we have some far more direct method of recognizing the presence of factors this suggestion cannot be positively gainsaid.

Let me call your attention also to the inference which this suggestion would have on the conception of evolution. We might extend the same reasoning to all cases of genetic variation, and thus conceive of all alike as due to loss of elements present in the original complex. For all practical purposes of symbolic expression we can still continue to use in our analyses the modes of representation hitherto adopted, but we must not, merely on the ground of apparent perversity, refuse to admit that the lines of argument here indicated may prove sound.

Much as we now know of the inheritance of these abnormalities—some common, others rare—we know little of the descent of the normal characteristics of an ordinary human population. Indeed the only normal characteristics

as to the genetic nature of which we have clear evidence, are the colour of the iris and, to some extent, the colour of the hair. Our knowledge of these is derived from the work of Hurst; he it was who first succeeded in determining the inheritance of eye colour, which had long been a puzzle to anthropologists. The facts which he collected clearly showed that the presence of pigment on the front of the iris—the condition commonly known as brown or black eyes—is a dominant, whereas the absence of this pigment—the eyes we variously call grey or blue—is a recessive. And so far, though I anticipate the possibility of exceptions, no example has yet been produced of two parents critically known to have blue eyes producing offspring with brown or black eyes. As similarly shown, red hair behaves as a recessive, and I understand that at the forthcoming meeting of the British Association in Birmingham Hurst will arrange a demonstration of this as exemplified by the inhabitants of a Midland village.

From the records of portraits of the royal house of Hapsburg it is clear that the familiar facial characteristics of the family behave with fair regularity as a dominant, and there are indications that several of the artistic gifts follow with some accuracy the course characteristic of recessives. By careful observation and record the list might rapidly be increased.

Referring to the descent of various forms of insanity, nothing has been made out with certainty with the exceptions that I have mentioned—hereditary chorea, which behaves as a dominant, and the condition somewhat vaguely described as feeble-mindedness, which behaves as a recessive. The genetic analysis of insanity is at the present time practically impossible from the fact that the diagnosis of the various forms of insanity is by no means clear, and also from the fact that the conditions of life have obviously much to do with the development of such weaknesses.

Similar difficulties arise in regard to deaf-mutism. It is not in question that this condition is very often transmitted, but forms of deafness are so various, and there is such uncertainty as to the nature of the condition in any given case that we cannot expect to perceive the operation of any regular system here. It is not impossible, also, that in regard to the descent of liability to infectious disease, we may hereafter trace rules similar to those which have now been established in plants, especially by Biffen.

I propose now briefly to allude to some other significant aspects of these results. First as to the nature of segregation. This, I think, we must regard as a process comparable with the mechanical separation of substances which will not mix, or mix imperfectly; whereas some factors are continually transmitted in their entirety, others are liable to be broken up by what I regard as a process of quantitative fractionation occurring in the mechanical dissociation of the elements at certain critical cell divisions. As to which are the critical cell divisions, we have no clear indication. I cannot agree with those of my colleagues who think segregation must occur exclusively in the maturation processes. The case of the double stock, in which the whole male side of the plant differs genetically from the female side, as proved by Miss Saunders, shows almost conclusively that segregation may occur in somatic divisions. It is also difficult otherwise to interpret the fact that in certain cases the parental combination influences the distribution of factors among the gametes so that the distribution among the grandchildren is different according to the way in which the characters were combined in their grandparents. Into these details I cannot now enter.

The tendency of our work, as you will perceive, is more and more to exhibit the definiteness and fixity of the laws of descent. The medical man, justly proud of what he can do to make good bodily shortcomings, looks naturally to the conditions of life as the influences which chiefly determine destiny. The statesman, to whom physiological fact is a mystery that he rarely feels any desire to explore, inclines naturally to a similar conception of life There are signs that more true views are beginning to prevail. It is impossible to study such pedigrees as those of night blindness, in which a condition introduced by one individual into a community hundreds of years ago continues to be perpetuated according to definite arithmetical rules among a remote posterity, without being impressed with the fact that whatever influences may be brought to bear by hygiene or by education, the ultimate decision rests with the germ cells. Evolutionary change is effected not so much by gradual transformation of masses under ameliorating or detrimental conditions, but, in the main, by the occurrence of individual and sporadic variation.

It is beyond my province to discuss in detail the practical question denoted by the word "eugenics." Those who are engaged in the work of physiological analysis probably do well to keep clear of those distractions. The direction, however, in which genetic research points is not difficult to determine. Sir James Crichton-Browne has discussed at this Congress the striking percentage increase of lunacy in recent decades, and, as always when such topics are under consideration, there are persons disposed to lay the blame on the conditions of life, the severity of the modern struggle, a greater or less consumption of alcohol or other drugs, and so forth; those, however, who have some knowledge of genetic physiology are aware that the whole force of modern science and legislation has hitherto been exercised in the preservation of defective strains in our midst, and will not feel serious hesitation as to the true cause of the increase.

The Mental Deficiency Bill we recognize as, in principle, a wise beginning of reform, but, on the other hand, we cannot hear without disquietude, of the violent measures that are being adopted in certain parts of the United States with similar objects. It is one thing to check the reproduction of hopeless defectives, but another to organize a wholesale tampering with the structure of the population, such as will follow if any marriage not regarded by officials as eugenic is liable to prohibition. This measure, we are told, is actually proposed in certain States. Nothing yet ascertained by genetic science justifies such a course, and we may well wonder how genius and the arts will fare in a community constructed according to the ideals of State Legislatures.

Philologists tell us that, by an irony of development, the word "dull" comes from the same original which in Dutch has become "dol"—mad, and is better known to most of us in the German equivalent "toll." But I anticipate that, connected as the ideas may be, we might, by ridding our community of mania, leave it gravely infected with dullness. There are other no less obvious considerations which I might develop, but I trust I have said enough to show that in the experimental analysis of genetics we have an instrument of novel and extraordinary power, and I am not alone in foreseeing that genetic science must profoundly influence the course of human thought, and, ultimately, the conduct of society.

Address

ON

THE RELATIONSHIP BETWEEN MEDICINE AND PUBLIC HEALTH.

DELIVERED AT THE SEVENTEENTH INTERNATIONAL CONGRESS OF MEDICINE.

BY

THE RIGHT HONOURABLE JOHN BURNS, M.P.,

PRESIDENT OF THE LOCAL GOVERNMENT BOARD.

I MUCH appreciate this opportunity of addressing an audience which is representative of the medical culture of the entire civilized world; an audience of men who have assembled to interchange experience, to report progress, and to give and receive mutual enlightenment in their glorious work for the benefit of suffering humanity.

My intention in addressing you to-day is in the first place to bear my testimony to the immense debt of gratitude owing to you by the whole of humanity. Arising out of this, my remarks will in the main be concerned with the intimate relationship which exists between medicine and public health.

THE SAVING OF LIFE.

When speaking of the marvellous lowering that has taken place in the death-rate in this country, one is perhaps too apt to remember only social and sanitary progress as the explanation of this great change. My address to you to-day may, I trust, serve to show the appreciation by the public of the fact that to a very large extent humanity is indebted for the saving of life

and of suffering that has occurred to the vast improvements in the science of cure as well as of prevention of disease.

As a layman, I cannot attempt to set out the details of the marvellous progress of medicine, especially in its relation to public health, since you last met in London in 1881, and in the years preceding that meeting. Were I to attempt that task not a single nationality represented here would fail to claim names of honour in the record. My imperfect record can give only a few of the names that will be familiar to you: Norway has had its Hansen, Russia its Pawlow and Metchnikoff (lent to France), Austro-Hungary its Semmelweis, France its Pasteur, Budin, and Roux, Italy its Celli and Marchiafava, Belgium its Bordet, Holland its Eijkman, Japan its Takaki and Kitasato, Germany its Koch and Ehrlich, America its Oliver Wendell Holmes, Morton, Read, Carroll, and Flexner, and the United Kingdom its Farr, Simpson, Jenner, Lister, Manson, and Ross.

I do not forget that I am here as the representative of public health in this country, and my remarks will be made chiefly from that standpoint. Although no impending triumphs of preventive medicine are likely to cause your glorious work in assuaging suffering to cease, I look forward to the time, which has indeed already partially come, when the family doctor will be engaged in advising as to means for preventing disease, in dissuading from habits inimical to health, in preventing overwork or laziness—both serious enemies of mankind—in reporting external conditions, whether of work or leisure, needing to be amended, and still more often in discovering the early symptoms of illness which if neglected may produce serious disease, and in securing the removal of their cause.

We have already glimpses of important directions in which this ideal of future work is being realized. I refer to the modern campaigns against tuberculosis, in aid of child welfare, and in connexion with school medical inspection, which are rapidly becoming part of the national life in this and in other countries.

The national system of medical inspection of scholars, and the "following up" of disease or disorder discovered at these inspections, is a work of the highest national importance. It is not only important in itself, but also in discovering a large amount of neglected illness, which should have received attention before school life, and to which child welfare work is now being increasingly directed. In all these relationships we are realizing to an increasing extent the essential continuity and interchangeability between treatment and prevention in our efforts to reduce disabling disease.

The Past Saving of Life.

Some conception of the progress already secured by the application of science, especially medical and sanitary science, to the problem of healthy living—and I trust at the same time some impetus to further triumphs on the part of your profession—may be given by the comparison to which I invite your consideration of the average experience of England and Wales during the three years 1909–11 with its experience during three years based on the average experience of 1871–80.

In the three years 1909–11, 1,529,060 deaths occurred in England and Wales. This number is 772,811 fewer than would have occurred had the average death-rate of 1871–80 held good for these three years. As shown in the following figures, the largest share of this saving of life during three years has occurred in the working years of life, and the gain thus secured to the economic capacity of the nation has been on a gigantic scale.

Comparing the aggregate experience of the three years 1909–11 in England and Wales with the experience of three years based on the average death-rate for the decennium 1871–80, the saving in these three years was:

At ages	0–1	...	...	over	98,000 persons
,,	1–5	...	...	,,	126,000 ,,
,,	5–15	...	...	,,	44,000 ,,
,,	15–25	...	...	,,	58,000 ,,
,,	25–35	...	...	,,	78,000 ,,
,,	35–45	...	...	,,	77,000 ,,
,,	45–55	...	...	,,	50,000 ,,
,,	55 and over		...	,,	114,000 ,,

The saving under certain special diseases is set out below. Comparing the aggregate experience of the three years 1909–11 with the experience of three years of the decennium 1871–80, the saving of life in three years was—

In respect of	small-pox	... ...	25,463
,, ,,	measles	... ...	7,824
,, ,,	scarlet fever	... ...	69,974
,, ,,	whooping-cough	... ...	30,884
,, ,,	fevers (typhus, enteric, simple continued fever)	... ...	45,339
,, ,,	puerperal fever	... ...	3,941
,, ,,	diarrhœa, dysentery, and cholera	... ...	32,996
,, ,,	pulmonary tuberculosis	...	114,799
,, ,,	other tuberculous diseases	...	36,338
	Total saving on these diseases	...	367,008

Nearly half the total saving has occurred under the heading of the diseases here enumerated.

If we take the whole of the thirty-two years 1881 to 1912, and consider the saving of life during this period, the figures are truly colossal. During these thirty-two years in England and Wales 17,083,751 deaths occurred.

Had the relatively high death-rates of 1871–80 continued during each of these thirty-two years with the populations of each of these years, 3,942,000 more deaths would have occurred than were actually experienced.

Expenditure of Local Authorities.

It is interesting to contrast the saving of life actually experienced during the last thirty-two years with the expenditure incurred by local authorities (sanitary and Poor Law authorities, county councils, joint hospital boards, etc.) during the forty years 1870 to 1909–10. During this period the total expenditure of all local authorities in England and Wales exceeded 3,000 millions sterling, of which amount over 500 millions was obtained on loan since the year 1882–3. At the end of 1909–10 the total indebtedness of local authorities exceeded 536 millions sterling, or about seven-tenths of the amount of the National Debt.

In the following table an analysis is made of the main items of loans by local authorities which may be regarded as directly or indirectly concerns of public health, and a comparison is made with the corresponding items for 1883–4. The figures are stated in round numbers:

	1883–4.	1909–10.
	£	£
Total outstanding debt for all purposes	165,000,000	536,000,000
Outstanding debt incurred;		
In respect of schools	14,000,000	46,000,000
,, highways, etc. ...	17,000,000	57,000,000
,, waterworks ...	29,000,000	127,000,000*
,, sewage and sewage disposal ...	15,000,000	42,000,000
,, housing	3,500,000	10,800,000
,, hospitals... ...	182,000	4,600,000†

* Including loans of Metropolitan Water Board.
† Does not include Poor Law institutions or Metropolitan Asylum Board institutions.

The above statement does not include municipal and Poor Law expenditure on the supply of gas, electricity, tramways, harbours, on asylums, police, markets, workhouses, etc.

Since 1882–3 local authorities have expended out of rates and by means of loans the following sums:

Education	£320,000,000
Highways, bridges, and ferries ...	289,000,000
Waterworks...	131,000,000
Sewerage and sewage disposal ...	89,000,000
Hospitals (not including Metropolitan Asylums Board and workhouse infirmaries)	20,000,000
Housing of working classes	11,000,000
	£860,000,000

A large proportion of the total sums mentioned above has been expended by local authorities on objects which are unrelated to the public health, though they may have increased the public comfort. The expenditure on education has doubtless helped the public health as well as national efficiency, though only a share of this expenditure should be allotted to the former heading. If we assume that 500 millions sterling have been expended which can be rightly associated with the saving of nearly four

million lives which has occurred during the last thirty-two years, and if we take the average economic value of a life saved—that is, prolonged to an older age—to be £150, a very modest estimate, evidently even this large sum can be regarded as having been a profitable investment. It has to be remembered that the benefit of many of the large capital expenditures on water supplies, sewerage, housing, hospitals, etc., will be reaped even more in the future than in the record of the past.

Periods of Progress.

How has the saving of life already achieved been secured? No complete answer can be given in a few sentences, and perhaps my best plan is to proceed by examples, drawing inferences from the historical facts of medicine, which are open to the layman as well as to the doctor.

The progress that has been made in this country during the nineteenth century comes within two overlapping periods. The first of these is the period of what may be called crude generalizations; the second is the period in which progress as to each disease has been based on the actual results of scientific investigation.

Motives of Progress.

In the progress of the earlier period—and happily the same motives continue to be potent now—motives of philanthropy, panic, and economic necessity combined to secure, though too slowly, the needed sanitary reform. I cannot stay to discuss the high value attaching to the devoted efforts of such men and women as John Howard and Elizabeth Fry, of Sadler, Oastler, and their collaborators, of Lord Shaftesbury, of Charles Dickens, of Charles Kingsley, and in official life of Edwin Chadwick, of the Poor Law Board, who succeeded in arousing England and securing improvement in the conditions of work and life, and even of imprisonment; nor of such men as David Livingstone, who did so much to "heal the open sore of the world" constituted by slavery, to open up tropical countries, and thus to prepare the way for the recent triumphs of tropical medicine. It is not without interest to note that the earliest successful attempts to enforce sanitation and to secure healthy conditions of work were in connexion with factory work. This involved the appointment of paid inspectors, introduced by the Act of 1833. Factory inspectors preceded medical officers of health and sanitary inspectors; and under the Home Office their beneficent work in industrial hygiene has, year by year, become more far-reaching and effective.

Next to philanthropy, panic has been, perhaps, the most efficient factor in early sanitary progress. So far as this country is concerned, cholera has been far from an unmixed evil. In 1831–2 it caused 41,544 deaths in the United Kingdom; and this led to spasmodic efforts on the part of many local boards of health to sweep the Augean stables of insalubrity. The lesson was not, however, sufficiently learnt until later epidemics of the same disease occurred, followed by the creation of local sanitary authorities, and the expenditure of large sums on schemes of water supply and sewerage.

The economic value of health and the wastefulness of premature sickness and death are not even now sufficiently realized; but the steadily increasing readiness of local authorities to expend money on sanitary measures indicates our increasing realization of the truth that national health is national wealth.

The Doctrine that Dirt Makes Disease.

It was the great merit of the work of Edwin Chadwick that he added to philanthropy the important economic motive, showing through numerous local investigations the regular association between unhealthy conditions and disease, and the production of pauperism by means of disease. Of the value of this generalization we are now fully advised. At least one half of the total cost of pauperism in recent years is stated to be swallowed up in direct dealing with sickness, and to this must be added the indirect contributions of sickness, through deaths of bread-winners, and the host of by-products of sickness with which disease helps to populate our workhouses.

Chadwick was largely influenced by the teaching of Dr. Southwood Smith and his collaborators, that epidemic diseases as a whole are the direct consequence of local insanitary conditions. This valuable generalization, as we now know, needs a modified and more accurate statement, specialized for each individual disease. In its original form, however, it embodied a realization of the immense power of the environment to make or mar the national life; it secured the beginning of our national improvements, and it laid the foundation of the house of health which as a nation we are building.

Typhus Fever.

The value of the teaching of this doctrine is shown in the almost complete annihilation of typhus fever and the rapid decline in amount of enteric fever. The history of typhus is a romance in sanitation, from which the principles and practice of preventive medicine could be adequately taught. It occurred under conditions of dirt and overcrowding; but, apparently, it arose only by direct infection from person to person. It was spread, like small-pox, by vagrants from parish to parish, repeatedly brought by them from Ireland to England, and it was not brought under control until the migrations of vagrants had been limited, the sick had been segregated in hospitals from the healthy, "contacts" had been kept under adequate supervision, and the houses harbouring the disease had been disinfected and the vermin therein destroyed. In many instances the courts and alleys, the favourite lurking places of the disease, were also swept away. Consider the following figures: In the ten years 1871–80, in Ireland, 7,495 deaths were returned as due to typhus fever; in the three years 1909–11 the number had fallen to 143. In England and Wales, in the ten years 1871–80, 13,975 deaths were caused by typhus fever; in the three years 1909–11, with a much larger population, the number thus caused was 30.

Enteric Fever.

The history of enteric fever is also very striking. In England and Wales in the ten years 1871–80, 78,421 deaths were ascribed to this disease; in the three years 1909–11, its greater population had 6,447 deaths from the same disease, a number far too large, and in some measure due to the fact that some local sanitary authorities still do not realize to the full extent the importance of the generalization that filth implies disease. The importance of this generalization is shown by the excess of this disease in towns in which privy and ashpit systems continue, and the water-carriage system of sewerage has not been installed.

When our medical officers of health—the advance guard in our army of sanitation, and our advisers as to the best line of action—came to investigate the facts, they ascertained that explosive epidemics of this disease are nearly always caused by specific excremental contamination of a public water supply or of a milk supply; and the knowledge of these facts conveyed to local sanitary authorities throughout the country has induced them to expend enormous sums on public water supplies and sewerage, and to the adoption of precautions in connexion with our milk supplies. With more accurate knowledge of the methods of spread of enteric fever it became clear that the nursing of enteric fever under the home conditions of the poor involved further spread of the disease; and to the use of isolation hospitals must be ascribed a large share in the realized reduction of enteric fever, as also of typhus fever. In recent years it has been shown that there is a residuum of enteric fever, not explicable by origin from the above-mentioned sources; and other smaller sources of infection have been traced, including chronic "carrier cases." Contaminated shellfish, especially mussels and oysters, have been shown to be responsible for a considerable amount of this disease, and I have at the present time under consideration the issue of regulations which will give sanitary authorities additional control over this source of infection. There is reason to expect that enteric fever will erelong be known, in fully civilized countries, like typhus fever, scurvy, and leprosy, as in the main an historical curiosity.

Stages in Registration of Disease.

The history of registration of disease is inseparably associated with that of public health, and it is convenient at this point to refer to this important subject. Until

the ugly facts as to excessive mortality under conditions of filth and overcrowding could be persistently obtruded upon the public mind, reform was difficult, sometimes impossible. The need of registration of deaths was realized as an instrument of sanitary progress — the epidemic of cholera in 1831–2 giving a great impetus in this direction — and political considerations aided its enactment.

It is not the least of Chadwick's great services to the State that he discovered William Farr, the humble apothecary, and placed him in charge of our national vital statistics. The series of reports issued by Farr have had an immense influence in promoting the public health. They threw the light of publicity on the towns and parts of towns in which fever and consumption throve, they enabled the moral of great epidemics to be pointed, and painstaking investigations into their causation to be made by medical officers of health and others. The later reports by Drs. Ogle, Tatham, and Stevenson have worthily continued the series initiated by Farr. In particular the decennial supplements have thrown valuable light on the incidence of industrial mortality.

As time went on it became clear that registration of deaths gave a very imperfect view of the prevalence of disease, and that, so far as infectious diseases were concerned, valuable time was lost when preventive action could only be taken after the patient's death. Death registration told of the total wrecks which had occurred during the storm; it gave no information as to early mishaps, enabling others to trim their vessels and thus weather through. It gave a list of killed in battle, not of the wounded also.

Progress occurred step by step, in our characteristic British fashion. Pioneer attempts were made by medical men in a number of districts to secure the voluntary notification of different forms of illness. The gradual failure of these attempts led to agitation in favour of the compulsory notification of the chief acute infectious diseases. Local powers for this purpose were secured by a few enterprising towns, in 1889 an Adoptive Act for the whole country was passed, and in 1899, by a further Act, the notification of these diseases was made compulsory throughout England and Wales. From time to time extensions of the list have been made by local authorities and by the Local Government Board; among the most recent additions have been the Orders by which the notification of poliomyelitis and cerebro-spinal fever has been made generally obligatory. It may be hoped that the more precise information thus obtained will throw new light on the conditions governing the spread of these serious diseases.

In a large number of districts ophthalmia of the newly born is already notifiable, and I am about to issue an Order making this disease notifiable in every sanitary area, and enabling sanitary authorities to provide the prompt medical aid and nursing which are required to prevent this serious cause of blindness in childhood.

But you will, I think, agree with me that the most important extension of the principle of notification has been in regard to tuberculosis. The knowledge that this disease is communicable, and the importance, even apart from the fact of communicability, of having exact knowledge of its special haunts, and of its prevalence in different industries, and among the poor living in crowded streets and courts, have enabled me step by step, by means of Departmental Orders, to apply the principle of compulsory notification to all forms of this disease. In order that public opinion might confirm the proposals, and to ensure that notification would be effective as well as merely prescribed, action was deliberately taken in stages.

On December 18th, 1908, an order was issued, making obligatory from January 1st, 1909, the notification of cases of pulmonary tuberculosis in Poor Law practice. This was followed on March 22nd, 1911, by an Order making the notification of cases of pulmonary tuberculosis in hospital practice obligatory from May 1st, 1911.

On November 15th, 1911, an Order was issued making it obligatory from January 1st, 1912, on all medical practitioners throughout England and Wales to notify cases of pulmonary tuberculosis occurring in their practice, whether public or private; and on December 19th, 1912, this duty was extended from February 1st, 1913, to all forms of tuberculosis.

I have made careful inquiries, both from private practitioners and from hospital physicians, and have been much gratified to find that each step in the extension of notification has been welcomed by them, and that instances in which hardships to patients have occurred *as the result of notification* are very few indeed.

This is due in part to the fact that notification is confidential in character, but also, and I believe chiefly, because the notification has not only enabled investigation of sources of infection to be made and precautionary measures to be adopted, but has also put the patient in the way to receive more efficient treatment. Tuberculosis is the one disease in which the fact that measures of treatment and of prevention are to a large extent identical is becoming fully realized; and the important endowment of the treatment of this disease in connexion with the National Insurance Act will enable local authorities and their officers to take active measures, both of prevention and treatment, on a larger scale than had been previously practicable.

During the last few years a weekly list of cases of certain imported diseases in foreign ports has been distributed by the Local Government Board to port medical officers of health, thus giving them warning of the points from which the importation of disease is particularly to be feared.

By an Order of the Local Government Board, dated December 13th, 1910, every medical officer of health has been required to send to the Board at the end of each week a list of the cases of the different infectious diseases notified in his area during the week; and during the following week a complete statement of these cases in each and all the 1,800 sanitary areas in England and Wales is distributed by the Board of which I am the head to each of the medical officers of health of these areas for their information.

For 1911 the first statistical return was prepared in my Medical Department showing the rate of sickness for each notifiable disease in every sanitary area; and by this means there is now accumulating a more accurate record of the sickness of each district than was previously possible. The influence of such information in securing investigation into the sources of disease, and in enabling pressure to be brought to bear on reluctant or obstructive authorities will be very great.

No mention of notification would be complete which omitted reference to the Notification of Births Act. This Act has enabled medical officers of health to obtain the information as to births within thirty-six hours of their occurrence, whereas registration may be delayed for six weeks; and by this means early visits can be made in suitable cases by means of nurses or health visitors competent to give useful advice. I am hopeful that this Act will ere long be adopted in every sanitary area. Already it applies to more than half of the total population of England and Wales.

THE SCIENTIFIC PERIOD OF DISEASE PREVENTION.

Historically, this cannot be separated from the earlier period of cruder, though most valuable, generalizations, in which already valuable work was being done by local sanitary authorities, under the guidance of their medical officers of health. The old generalizations, embodied in our warfare against overcrowding, uncleanliness, the herding of families in unsatisfactory houses, against impure water supplies, against accumulated filth in and about the dwelling, against dusty occupations, retain their full value, and the warfare against these evils still needs to be pursued with unabated energy. Each year, however, our knowledge of the causation of individual diseases is becoming more exact, and our warfare against disease can be pursued not only with what may be described as the bludgeon, but also with arms of exactitude not previously available.

Louis Pasteur.

The pioneer of this period, who showed the way along which you are now so successfully travelling, was one who was on the platform of the meeting of this International Congress in August, 1881, when last it met in London. He was then your most honoured member, and the immense possibilities of future prevention of disease opened out by him were already being realized. Need

I say that I refer to Louis Pasteur—a name to be ever held in reverence as that of the father of scientific preventive medicine? Although himself originally a chemist, he has exercised a greater influence on medicine than any other man since Harvey. He succeeded in destroying the idea of spontaneous generation, and in establishing on a firm basis the germ theory of disease. As has been well said, he associated the faith of an apostle with the inquiring patience of a scientist. With indomitable courage he pursued his investigations, undeterred by obstacles and opposition. When his friend said to him, "Studies of that sort require much courage," his simple answer was, "What about duty?"

It would ill beseem me as a layman to attempt before an audience of medical men, including our distinguished French *confrères*, to describe the work of Pasteur. I like to think of it especially as leading up to and inspiring that supremely important work of Lister, which has revolutionized surgery and saved an untold number of lives.

Lister and Surgery.

May I be excused for dwelling for a moment or two on Lister's work and its results? Born in 1827, in 1860 he became surgeon at the Glasgow General Infirmary, where, as elsewhere, the surgical wards were ravaged by erysipelas, pyaemia, and hospital gangrene. The introduction of ether as an anaesthetic by Morton in America, and the later introduction of chloroform by Simpson in 1847, although they prevented an enormous amount of suffering, had temporarily increased the mortality of surgery, by rendering operations painless, and therefore more frequent, in wards in which septic infection prevailed. In those days suppuration was regarded as a normal process, now when it occurs as the result of an operation it is regarded as a grave reflection on the surgeon in whose practice it appears. Applying Pasteur's discovery that putrefactive fermentation is due to microbes introduced from without, Lister, by antiseptic methods, without altered sanitation of his wards, so improved their record that in 1867 he was able to report that during the preceding nine months not a single case of erysipelas, pyaemia, or gangrene had occurred among his patients.

It is impossible to express statistically the saving of life and suffering effected through Lister's work, but its magnitude is well known to all of you. Operations which in former times were needed to save life were commonly followed by sepsis and death. A major operation for a compound fracture or other serious injury often meant merely the postponement for a few days of the fatal result. In many hospitals, and sometimes for long periods, each surgical patient in succession was liable to be attacked by erysipelas, pyaemia, or gangrene. Little wonder, then, that hospitals were regarded as death-traps, and an operation in the poorest home often had a greater prospect of success than a similar operation by a distinguished surgeon in our largest and best hospitals. The hospital and its architect were commonly blamed for this, and the fact that death lurked in the skin of the patient himself, in the finger-nails of the surgeon, and in the sponges of the nurse, was unrealized. Listerism has changed all this. It has done more. It has made possible triumphs of cure not previously dreamt of. Abdominal diseases and diseases of the brain and its coverings, formerly inevitably fatal, have come within the range of treatment, and the possibilities of saving and prolonging life have been immensely increased. The following comparison of the experience of two of the largest metropolitan hospitals shows the greater extent to which operative assistance can now be given to patients. In 1878, 15.2 per cent. of the total surgical patients in these hospitals (4,531 in number), and in 1911, 79.1 per cent. of the total surgical patients in these hospitals (6,490 in number), received operative treatment.

As a by-product of Listerism there has been an almost incalculable saving of pain, directly in connexion with the progress of injuries and operations, and indirectly in consequence of the number of painful conditions which can now be attacked by operative measures. We may therefore add the name of Lister to those of pain destroyers, which include also Morton and Simpson, the introducers of ether and chloroform respectively as anaesthetics, and the modern chemists who have introduced the wonderful series of drugs producing local anaesthesia.

Semmelweis and Puerperal Fever.

From Listerism we may pass on to mention puerperal fever, a specially urgent case for the application of Listerism, an application which—if the teaching of Semmelweis had been appreciated—would have been adopted before Lister. As early as 1847, Semmelweis demonstrated that puerperal fever was caused in the lying-in wards in his clinic at Vienna by contact infection, brought by students who were also engaged in the *post-mortem* or dissecting room or in surgical wards in which there were open wounds. In 1849 Semmelweis's work was brought before a London medical society. Unhappily its importance was not realized, and so the triumph of antisepticism and asepticism in midwifery was postponed; for the child-bearing mother the full realization of freedom from risk of sepsis, which is a fair claim for every expectant mother to make, is still far from being realized. Our national figures show improvement in the death-rate from puerperal sepsis; a less improvement in regard to the accidents and diseases of pregnancy and childbirth. Even in regard to puerperal sepsis alone the record is not entirely satisfactory.

From puerperal fever and the accidents of childbirth

In the ten years	1877–86	one mother	died to	226	births.
"	1887–96	"	"	197	"
"	1897–1906	"	"	228	"
In the year	1907	"	"	261	"
"	1908	"	"	280	"
"	1909	"	"	270	"
"	1910	"	"	281	"
"	1911	"	"	262	"

So far as London is concerned, I have recently authorized the admission of patients suffering from puerperal fever into the hospitals of the Metropolitan Asylums Board; and there is no reason why, with an improved service of midwives, better nursing, and the strictest asepticism in practice, puerperal fever should not become extremely rare.

Koch and Tuberculosis.

It is difficult to speak of tuberculosis without merely repeating the already familiar. In devoting a few minutes to this important disease, I wish to associate my remarks with the name of Robert Koch, who lifted our knowledge of this disease from the empirical to the scientific. Koch was one of many instances in medicine of genius triumphing over poverty. He was an obscure practitioner in a small country place, where he was able to demonstrate improvements of technique in bacteriology, which opened up a new epoch in this science. In 1882 he proved that tuberculosis is caused by the tubercle bacillus, and demonstrated the bacillus. He caused much searching of heart at the Congress in London in 1901 by his frank expression of opinion that bovine infection had very small importance in the production of human tuberculosis. More recent investigation has shown that bovine infection cannot be disregarded as a cause of tuberculosis in children; but his statement has doubtless led to greater concentration than there would otherwise have been, on measures to prevent infection from man to man. He steadfastly held to the view that tuberculosis in the main is a disease of the dwelling, more particularly of the bedroom.

I cannot express this better than in Koch's own words, uttered in his Nobel lecture in 1906:

> The danger of infection becomes especially great when healthy people have to sleep in the same rooms with sick people, and even, as unfortunately still frequently happens among the poor, in the same bed. This kind of infection has struck attentive observers as so important that tuberculosis has been frankly and justly called a dwelling disease.
>
> In Berlin during the last decade more than 40 per cent. of the cases of pulmonary phthisis died in hospitals. In Stockholm, too, the state of affairs must be very favourable in this respect. The number of patients that are thus placed in circumstances under which they can no longer infect is very considerable, and cannot fail to influence the course of the pestilence.

The improvement of the situation of the lower classes and the better knowledge of the danger of infection, the consequence of which is that people no longer unwittingly expose themselves to it, have certainly helped to reduce tuberculosis. But I am firmly convinced that the better provision for patients in the last stage of pulmonary phthisis—namely, the lodging of them in hospitals, which is done in England and in Prussia to a comparatively large extent—has contributed most to the improvement. From this, however, we are to derive the lesson that the greatest stress is to be laid on this measure—namely, *the placing of cases of pulmonary phthisis in suitable establishments*, and far more care should be taken than hitherto that such patients do not die in their dwellings, where, moreover, they are for the most part in a helpless situation and inadequately nursed. If cases of pulmonary phthisis are no longer, as hitherto, rejected by the hospitals as incurable; if, on the contrary, we offer them the best imaginable nursing gratis and can even in some cases hold forth the hope of cure; if, moreover, their families are cared for during their illness, not the slightest compulsion will be necessary to induce a still much greater number of these unfortunate patients to go to hospitals than at present.

Factors in Reduction of Tuberculosis.

The causes of the remarkable reduction of tuberculosis in this and some other countries during the last thirty or forty years cannot, however, be stated in a single proposition; and looked at from various standpoints, diverse statements are possible, each containing a considerable share of the entire truth.

In the three years 1909–11, tuberculosis of all parts of the body caused 151,137 fewer deaths in England and Wales than would have occurred had the experience of 1871–80 been continued.

Comparing the percentage reduction for phthisis and for all non-tuberculous diseases in the aggregate for five yearly periods, from 1876–80 onwards, we obtain the following results:

Percentage Reduction (−) or Increase (+) between	Phthisis in Males.	All Causes, Omitting Tuberculosis in Males.
1876-80 and 1881-5	−9.8	−6.2
1881-5 and 1886-90	−8.3	−0.5
1886-90 and 1891-5	−9.5	unaltered
1891-5 and 1896-1900	−8.3	−4.1
1896-1900 and 1901-5	−7.0	−9.0
1901-5 and 1906-10	−9.7	−8.8

It will be seen that there has been a fairly steady decline in the death-rate from phthisis, while the decline in the death-rate from all causes, excluding tuberculosis, has been irregular in amount, and only in recent years has approached that from phthisis.

Improvements in housing, progress in average social conditions, higher nutrition, all have doubtless borne their share in bringing about this great reduction in tuberculosis. More cleanly habits of the people must be given a large share in securing the result. The habit of indiscriminate spitting, although still prevalent, is much less so than in the past. The standard of domestic cleanliness has improved, and this must have cleaned out many of the former centres of infection. Even more importance must be attached to the diminished overcrowding of bedrooms.

Overcrowding in bedrooms under all circumstances is liable to become a source of disease, still more so when sick persons are participants in the overcrowding. This being the case, there can be no hesitation in accepting the statement that consumption is spread largely in the bedroom, and that, as Koch repeatedly pointed out, one of the most important means for stopping its spread is to prevent the sleeping of consumptives in the same bedroom, and still more important in the same bed as healthy persons.

A Partial Antidote to Urbanization.

In this connexion further stress may be laid on the fact emphasized by Koch that the reduction of phthisis in this country has been associated with a steady increase in the use of hospitals for the tuberculous sick. The use of these hospitals has not been directed to the segregation of the sick. Their use has formed part of the greater humanity of the nineteenth and twentieth centuries, and of the increasing demand for treatment of the sick under the most advantageous conditions. Incidentally, such increased expenditure on the hospital treatment of the sick has been made possible by our increased national prosperity; and a not very inaccurate index of national welfare in any country would be constituted by a comparative statement of its hospital provision. But let me state the facts for England and Wales. A comparison of 1881 with 1910 is given below.

In	Percentage of the Total Deaths from all Causes occurring in Public Institutions.			
	London.		England and Wales.	
	1881.	1910.	1881.	1910.
Workhouses and workhouse infirmaries	13.1	22.9	7.0	10.9
Hospitals	7.3	17.6	2.8	7.5
Lunatic asylums	0.4	0.8	1.0	2.1
Total	20.8	41.3	10.8	20.5

In the country as a whole, in 1881, 1 out of every 9 deaths, and in 1910, 1 out of every 5 deaths; in London in 1881, 1 out of every 5, and in 1910, 2 out of every 5 deaths occurred in public institutions. So far as phthisis is concerned, it is significant that in 1911, in the whole of England and Wales, 34 per cent. of the male and 22 per cent. of the female deaths, and in London 59 per cent. of the male and 48 per cent. of the female deaths from this disease occurred in public institutions. Inquiries at these institutions show that the patients had usually spent several months in them prior to death. By this means, therefore, not only had the families of the patients been relieved of a serious burden, but also had been released from the risk of infection, at a time when this was especially difficult to control.

The rapidly increasing urbanization of our population must be remembered in connexion with this reduction of phthisis and increase in its institutional treatment. No fact is better established than that tuberculosis claims more victims out of a given number living in towns than in rural districts. In London the phthisis death-rate in males in 1911 was 1.68 per 1,000 of population, being 1.50 in the aggregate county boroughs, 1.04 in other urban districts, and 1.32 in the aggregate rural districts. Now, the proportion of the total population living under the relatively unfavourable conditions of town life has during this period of declining tuberculosis steadily increased. The proportion of the total population in England and Wales living in rural districts has decreased from one-half to less than a quarter between 1851 and 1911. It is evident, therefore, that some important influences have been at work counteracting the effect of urban conditions as a whole on tuberculosis. Among these, important place must be given to the hygienic effect of the stay for months in an infirmary or a hospital of a high proportion of the total consumptive population at the most infectious and helpless periods of their illness.

At the present time the prospect of complete control over tuberculosis is more promising than ever before. Not only is public administration, with its magnificent past effect on tuberculosis, becoming increasingly efficient, but the National Insurance Act, happily, has given further important means of effective attack against this disease. The sanatorium benefit was necessarily confined to insured persons, with possible extension to their dependants. The capital grant of 1½ millions for the building of institutions for the treatment of tuberculosis was made for the entire community; and the further promise by the Chancellor of the Exchequer to contribute half the cost of schemes of treatment of tuberculosis—beyond the cost of treating the insured—for the entire community, has opened the way for complete schemes of prevention and treatment, which are now in process of gradual realization throughout the length and breadth of the land. These schemes ensure early diagnosis, prompt treatment, and the removal of sources of infection, by adequately linked-up measures of

domiciliary treatment, and of treatment at dispensaries, hospitals, and sanatoriums. When these schemes are matured, there will, it is believed, be no need for any patient to lack the means of treatment under the conditions best adapted to his welfare.

Possibilities of Further Progress.

In giving these illustrations of what medicine and the sanitary service of the country have accomplished, my survey has necessarily been incomplete. Not only is there a marvellous record for typhus and enteric fever, and for tuberculosis, but also for the diseases and accidents for which medical aid is required, and to a less extent for puerperal fever. A still more striking illustration could be found in small-pox, and even measles and whooping-cough in recent years appear to be losing some of their power under the influence of the child welfare work which is gradually becoming systematized in many sanitary areas. The marvellous advances in tropical medicine are well known to all of you. Future generations will hold in gratitude the memory of Laveran, Manson and Ross, of Reed and Carroll, and of many others who are rapidly transforming the tropical countries, formerly known as white men's graves, into places in which the European can live with safety, if not also with comfort.

The saving of life in this country has not been confined to the diseases ordinarily regarded as preventable and curable. Even cancer, if recognized and treated at an early stage, and when accessible to the surgeon, loses a portion of its terrors; and it cannot be that the concentration on investigation of this disease in nearly every civilized country will fail during the next few years to add it, like tuberculosis, to the diseases doomed to insignificance, if not actual annihilation. When the next International Congress of Medicine meets in London, who among you will be the hero to be honoured in regard to this disease, as Pasteur was honoured as the leader of a new era of preventive medicine when you met in this place in the year 1881?

With the discovery by Schaudinn of the spirochaete of syphilis, and with that wonderful application of chemistry to therapeutics which the genius of Ehrlich has placed at your service for the rapid treatment of this disease, we may hope for more systematic and universal treatment of syphilis, and the removal of one of the great cankers of humanity.

I have not time to speak of the improvement in infant and child mortality which has been realized in recent years, thanks in large measure to the active work undertaken by the officers of sanitary authorities, acting in co-operation with voluntary associations. Full details of this are given in a recent report issued by the Local Government Board, and the subject was fully discussed at last week's important conference, over which I presided.

Alcoholism and Disease.

Nor can I linger for more than a moment over the improvement in regard to alcoholism which our national statistics reveal. Although in our national life vast sums of money are still wasted on alcoholic drinks, the amount is declining, and I cannot refrain from associating this fact in some measure with the declining death-rate from all causes in the aggregate, and more particularly with the declining death-rate among infants and from tuberculosis. The association in regard to infant mortality obviously is through the diminution of neglect and the improved standard of domestic life.

In regard to alcohol, the responsibility of the medical man is very heavy. The medical opinions of one decade are the popular opinions of the next; and for the inordinate belief in the dietetic and therapeutic value of alcohol, is not the medical profession in some degree responsible? It is gratifying to find that this is now altered. The following figures from the excellent work on alcohol by Sir Victor Horsley and Dr. Sturge may be quoted. In 1862 the patients occupying 2,254 beds in seven metropolitan hospitals consumed alcoholic liquids to the value of £7,712. In 1902 the amount spent in connexion with 2,309 beds in the same hospitals was £2,925. In 1875, 1,405 patients were treated in the Wandsworth Union Infirmary, and the alcoholic expenditure was £371. In 1905, 5,451 patients were treated, and the alcoholic expenditure was only £2 7s. 5d. Again, during the year ended March 31st, 1912, the total expenditure on alcohol in the workhouses and infirmaries of the metropolis was £1,743. Taking the average daily number of inmates as 50,900, this amounts only to about 1d. per inmate per week.

My review of our indebtedness to medicine for public health progress would be incomplete did I not refer to the aids which biology and chemistry are now giving us in the diagnosis and treatment of disease, and to the important subjects of hospitals and of nursing.

The Application of Science in Medical Practice.

The teaching of recent years is bringing home even to the man in the street the importance of all branches of science in relation to medicine. All knowledge sooner or later is pressed into the service of humanity, and it is therefore the bounden duty of the people as represented by the Central Government and by local authorities to give all practicable assistance, not only in utilizing to the full extent our present knowledge, but also in extending its borders.

The value of the *x* rays in the diagnosis and treatment of disease, the possibilities opened out by radium, the almost magical contributions of chemistry as illustrated in the work of Ehrlich and others, can only be mentioned in passing.

Happily there are signs that medical research will be assisted by the State in future on a scale not previously contemplated; and in this connexion special mention must be made of the promise contained in the prospective expenditure in this country on sound and broad lines of the sum of some £58,000 per annum in connexion with the National Insurance Act.

Another branch of work in which research and scientific diagnosis are admirably commingled is exemplified by the splendid work which is now being done in the clinical laboratories by many of our large general hospitals. These laboratories provide facilities for the accurate and complete diagnosis of disease occurring among the poorest of the population which are as yet inaccessible to the vast majority of the total population, who are treated in their own homes. This limitation of valuable life-saving and disease-preventing work ought not to continue. I do not forget the fact that a large number of local authorities have provided facilities for the diagnosis of the three diseases, diphtheria, enteric fever, and pulmonary tuberculosis. It may be hoped that in the near future it will be practicable to extend the work done in laboratories, and to make it available for the wider needs of general practitioners, thus enabling them to bring up their work more nearly to the level of that carried on in well-equipped hospitals. If this is to be secured, it is essential that every medical practitioner should have the opportunity of utilizing for every patient the best means for accurate diagnosis which modern medical science provides.

The Ever-increasing Institutional Treatment of Disease.

I have already spoken of the increasing extent to which the sick are treated in institutions. Although at first sight the connexion may not be obvious, I regard this as an essential branch of the subject of housing. If overcrowding is dangerous among those who are well, its danger is multiplied if the sick are commingled with the healthy; and it is almost certain that the universal excess of disease in town over country would have been much greater had it not been for the assistance given by the hospital to supplement domestic housing and nursing. It is not too much to claim for our hospitals that they have gone far towards removing the harmful effects of aggregation of populations in towns. Think, for instance, not only of the relief to the patients themselves, but of the easing of the burden borne by the overworked family, which is involved in the simple statement that in the year 1911 in the whole of England and Wales 24 per cent., and in London 47 per cent., of the total deaths from cancer occurred in public institutions. But I am speaking to those who, with the philanthropists, have rendered this supremely beneficent work possible, and who have in very

large measure carried it out; and I need, therefore, only add a few figures which will make still clearer the enormous extent to which the home has been relieved by the hospital. I am indebted for these figures to *Burdett's Hospital Annual*. In the United Kingdom there were in 1911, 49,854 beds in voluntary hospitals, or about 11 beds to 10,000 inhabitants, 80 per cent. of these being in daily occupation. The average stay for each patient was twenty-five days. These hospitals, including dispensaries, had in 1896 an income of £2,528,000, which in 1911 had increased to £4,185,000. The beds here enumerated do not include the much larger number in our workhouses and infirmaries, lunatic asylums, isolation hospitals, etc.

THE WORK OF THE NURSE.

The noble work of the medical profession in the treatment and prevention of disease would have been in large measure ineffective but for the devoted work of the nurse. In every age of the world there have been "born" nurses, but the "trained" nurse is a product of recent times. It is scarcely for me to sum up the qualities of the ideal nurse, but I may safely say that no amount of training will compensate if there is not also the tenderness of touch, the kindness of heart, and the desire to serve, without which the highest and best nursing cannot be secured. Personal experiences of many, if not of all of us, make us confident that paid service is not incompatible with the devotion and self-denial which we associate specially with unpaid service, and without which skilled nursing fails in an important respect.

The history of nursing is bound up with that of Florence Nightingale. Until beyond the middle of the nineteenth century Sairey Gamp and Betsy Prig were scarcely exaggerated types of the hired nurse. But in 1851 Florence Nightingale entered the Deaconess's Institute at Kaiserswerth on the Rhine, and thus apparently the impetus for improved nursing in this country appears to have originated in a German charitable nursing institution. The great work of "the lady with the lamp" in the Crimea is well known. With courage and knowledge and with inflexible discipline at the military hospital at Scutari she changed a seething mass of loathsome contagion and confusion into a cleanly organization of sick patients.

With the gift of £50,000 raised for her by a grateful public she endowed at St. Thomas's Hospital the first great nursing school in this country, and she thus founded our modern system for the training of nurses.

The growth of the profession of nursing is among the most striking social facts of the last thirty years. As medicine progresses and becomes more exact the need of nurses to carry out the details of medical instructions becomes more clamant. In Poor Law institutions alone some idea of progress may be gained from the statement that in 1897 the total nurses employed numbered 4,100; in 1907 they had become 6,500; in 1911 nearly 7,500; and in 1912 over 7,600. For the voluntary hospitals, complete figures are difficult to give, but the following figures, taken from that valuable compilation, *Burdett's Hospital Annual*, will give some conception of the magnitude of their work in institutions.

	1911.	
	No. of Occupied Beds.	Total Nursing Staff.
A. *Hospitals with Medical Schools:*		
Eleven London hospitals ...	4,031	2,055
Nine provincial hospitals ...	2,295	833
Five Scottish hospitals ...	2,511	848
B. *Other General Hospitals:*		
In London	970	368
In provinces	3,385	1,151
In Scotland	281	92
C. *Special Hospitals:*		
In the United Kingdom	2,027	736
	15,500	6,083

For every five patients in these institutions two nurses are provided, including day and night service.

These numbers do not take into account the large number of nurses engaged in private nursing. Nor do they include the nurses whose work is even more closely associated than that of the institutional or private nurse with the prevention of disease. In London and the chief centres of population we have the Queen's Jubilee nurses, in many counties county nursing associations, and in nearly every parish a nurse who is engaged in helping the poor in sickness. This help does not consist solely in the valuable aid rendered at time of distress. Good district nursing also implies the teaching by example of methods of nursing and personal hygiene, which in the after-life of the assisted family are probably more valuable than the immediate aid.

Did time permit, one might advantageously discuss the valuable work of female sanitary inspectors, health visitors, tuberculosis nurses, and school nurses, which is having important influence in reducing infant mortality, in preventing the spread of infection, and in securing a higher standard of domestic and personal cleanliness. But I must conclude my brief review of the progress of medicine and the work ancillary to it in relation to public health.

NATIONAL INTERDEPENDENCE IN RELATION TO HEALTH.

Your presence here to-day emphasizes the international aspect of health. Rapid travel by land and water implies greatly increased possibilities of spread of disease. Happily, owing to intercommunication of information and improved administrative measures, precautions can more than counterbalance the increased possibilities of disease. News of danger can be transmitted by telephone, telegraph, cable, or wireless; a whisper is heard from one hemisphere to another, and so the benefits of intelligence and supervision can be universally shared. In other directions the possibilities of healthy life have been indefinitely increased. Our food is collected from all countries, and we send in exchange our manufactures, each country according to its special facilities or aptitude. Commerce and finance have formed a meshwork which covers the earth.

Medical knowledge in particular is cosmopolitan. Each country has brought its contribution. I have already mentioned the names of Pasteur and Lister, of Semmelweis and Koch, of Laveran, Manson, and Ross, and others. They stand out; but every great discovery has its background of smaller contributions to the common stock of knowledge without which no great achievement is secured; and every nationality has added its quota. So is it also with reforms. A reform in one country initiates or gives added impetus to efforts towards reform in other countries; and the tendency to follow becomes almost irresistible. In some countries it has already become a duty of civilized life to prevent anxiety as to the means of subsistence in old age; and so old age pensions have been inaugurated. In every country increased attention is being paid to the need to aid, when necessary, the widow to bring up her children; and insurance against accidents and disease is already in operation in Germany and in the United Kingdom. Every effort forwards is valuable not only to the country immediately concerned, but also to every country; even mistakes by one nation add to our common stock of wisdom.

In no department of advance is cosmopolitanism so important as in regard to social reform, an important share of which consists in the development of the medical possibilities of improved health and well-being. The chief impediment to such reform is wastefulness, and one source of waste, expenditure on armaments, stands head and shoulders above all others. If this waste could be prevented, gigantic sums would be released for the reforms waiting to be financed. The chief among these is concerned with the problem of poverty, and this problem will need to be attacked on an enlarged scale by removing the known causes of poverty, not merely by applying palliatives to its effects.

It is not too much to hope that this Congress will help to hasten the period of international peace and good-will, earnestly desired by us all, in which our only rivalries will be in commerce, in progress, in science, and in the art of healthy and pure living.

THE NECESSITY FOR A MORE THOROUGH CONTROL OF THE MILK SUPPLY IN COMBATING SURGICAL TUBERCULOSIS IN CHILDHOOD.

By HAROLD J. STILES, F.R.C.S.EDIN.,
SURGEON TO THE ROYAL EDINBURGH HOSPITAL FOR SICK CHILDREN.

THE British Royal Commission, along with Theodore Smith and others, have done valuable work in developing the methods by means of which we are now able to ascertain whether a given case of tuberculosis is of human or bovine origin.

Professor Delépine has for several years carried out important investigations in Manchester in regard to the tuberculous milk question, and he has shown that much still remains to be done to diminish the amount of tuberculous milk which is supplied to our large cities.

The control of the Edinburgh milk supply is very inadequate, and it is a remarkable fact that the Public Health Department has no power to enforce the slaughter of the cows with tuberculous udders which the veterinary inspector comes across from time to time in the city byres; the medical officer of health has merely power to order the diseased animal to be removed outside the city boundaries.

Fortunately comparatively large quantities of the bacilli are necessary to produce tuberculosis by ingestion; were it otherwise the disease would be even more prevalent amongst children than it is. *Post-mortem* records in this country show that in about 25 per cent. of the children possessing tuberculous lesions the infection has taken place through the alimentary tract.

As the result of my clinical experience in the Royal Edinburgh Hospital for Sick Children, I have for many years been convinced that Koch and his disciples committed a serious error in practically disregarding the milk as a source of tuberculous infection in children. I could adduce many instances from my own personal observation where the etiological relationship between the disease and the "milk history" of the child was so closely associated as to amount almost to proof that the bovine bacillus was the source of infection.

It occurred to me that the wealth of material derived from my operations on bone and joint and gland cases at the Royal Edinburgh Hospital for Sick Children might be utilized to supplement the work of the British Royal Commission, and to determine more precisely the relative frequency of human and bovine infections in the surgical forms of tuberculosis in childhood.

The bacteriological researches were carried out in the laboratory of the Royal College of Physicians of Edinburgh by my assistants, Drs. John Fraser and A. P. Mitchell. The former undertook the investigation of the bone and joint material; the latter that derived from the cases of cervical adenitis. Both Dr. Fraser and Dr. Mitchell embodied their results in a thesis for which the University of Edinburgh has awarded them a gold medal.

Of the 67 consecutive tuberculous bone and joint cases in children which Dr. Fraser investigated, the bovine bacillus was present in 41 (61 per cent.), the human bacillus in 23 (34 per cent.), while in 3 cases both types were present.

Forty-one of the children were under 4 years of age, and in these no less than 78 per cent. owed the disease to the bovine bacillus. On going into the history of the cases it was found that in those in which the bacillus was of the human type there was a history of consumption in at least one member of the family in 71 per cent. of the cases—a fact which brings out very forcibly the importance of segregating cases of active pulmonary tuberculosis. The bovine bacillus was the organism found in all the children less than 12 months old, and it is important to note that each of these had been entirely nourished on cow's milk. Of the 12 children between 1 and 2 years of age, 8 owed the disease to the bovine bacillus; and here, again, they had all been brought up from birth on cow's milk. In none of the children artificially fed had the milk been sterilized.

Dr. A. P. Mitchell, my present private assistant, has just completed the investigation of 72 cases of tuberculous cervical glands operated on at the Royal Edinburgh Hospital for Sick Children during the past two years. He found that in 65—that is to say, in no less than 90 per cent.—the disease was due to the bovine bacillus, while in only 7 (10 per cent.) was it caused by the human bacillus.

I desire to draw special attention to the fact that Dr. Mitchell's results give a far larger proportion of bovine infections than has been found by other observers. The great value of his results lies in the fact that they have been obtained from a consecutive series of cases derived from one institution. Moreover, by going carefully into the records of the cases he has been able to correlate his pathological findings with the clinical histories, and has found ample explanation for the very large proportion of bovine infections.

Of the 72 cases no less than 38 occurred in children under 5 years of age, and of these all but 3 were bovine infections. The maximum incidence occurred during the second year, and it is interesting to note that Dr. Mitchell found that 84 per cent. of the children under 2 years of age had been brought up since birth on raw cow's milk.

With regard to the history of tuberculosis in other members of the family, it was found that out of 65 children infected with the bovine bacillus there was not a single case in which a history of pulmonary tuberculosis could be obtained in the family. In 14 cases, however, one or more of the other children suffered from some form of surgical tuberculosis, and the evidence pointed to the strong probability that in each of these families the children had acquired the tuberculous disease from an infected milk supply. In the 72 cases there were only 3 instances in which a history of pulmonary tuberculosis could be obtained in the parents, and it is interesting to note that in each of these 3 cases it was the human bacillus which was isolated from the cervical glands. It is not surprising to learn that Dr. Mitchell found thas practically half the cases he investigated came from rural districts, where, as is well known, there is little or no veterinary inspection of cows.

Dr. Mitchell found that in 51 of the cases the tonsillar lymphatic gland was the first to become involved, and in 44 of the cases the posterior as well as the anterior group of upper deep cervical glands was also involved.

Most observers are agreed that the faucial tonsils are the chief portals by means of which the bacilli reach the upper carotid glands. Some years ago Mr. Scott Carmichael, who was then assistant surgeon to the Royal Edinburgh Hospital for Sick Children, and myself, endeavoured to obtain definite information as to the frequency with which tuberculous disease of the tonsil could be demonstrated histologically in the tonsils which were removed in children who suffered also from tuberculous disease of the upper carotid glands. Of the 50 tonsils examined, 7 (14 per cent.) showed histological evidence of tubercle.

Dr. Mitchell investigated the faucial tonsils removed from 64 consecutive cases of children suffering from tuberculous disease of the upper deep cervical glands. He found histological evidence of tubercle in the tonsils in 39 per cent. of the cases. In 30 per cent. positive results were obtained by inoculating guinea-pigs, and in these the bovine bacillus was isolated in 12 cases, and the human in 3 cases. Dr. Mitchell also investigated the hypertrophied tonsils removed from 90 children in whom the cervical glands showed no clinical evidence of disease; 6.5 per cent. of these hypertrophied tonsils gave microscopical evidence of tuberculous disease, while 10 per cent. gave positive results when inoculated into guinea-pigs.

Dr. Mitchell has thus afforded us proof of the great importance of the tonsils as portals of entrance through which the bacilli reach the cervical glands. The tonsils must therefore be looked upon as the chief manufactory

* A paper read in the Section of Diseases of Children of the International Medical Congress. A detailed report on the treatment of tuberculosis in childhood from the surgical point of view, with special reference to the bones, joints, and glands, was presented in print to the Section by Mr. Stiles.

and storehouse from which the cervical glands derive a continuous and progressive supply of infective material. In this connexion I may mention that for some years back I had observed that in those cases in which the cervical disease was unusually rapid and extensive the tonsils were almost invariably tuberculous. The reason why greater attention has not been paid to primary tuberculous disease of the tonsils is no doubt because, in the majority of cases, the naked eye changes are not sufficient to enable the disease to be recognized clinically.

Dr. Mitchell's researches prove that, in this country at any rate, tuberculous disease of the upper carotid glands in children is due to the ingestion of tubercle bacilli contained in cow's milk much more frequently than to the inhalation of human tubercle bacilli in the form of dust contaminated with dried sputum or in the form of a moist spray derived from the coughing of a consumptive patient.

I do not agree, however, with the view held by von Behring and his followers—namely, that pulmonary tuberculosis is almost invariably due to tubercle bacilli which have been ingested during infancy and childhood, and which have passed from the lymphatics into the venous circulation, and thence to the lungs. As only bacilli of the human type have been isolated from cases of true pulmonary tuberculosis, von Behring's hypothesis necessarily implies a transformation of the bovine into the human type. Most observers are, I think, agreed that such a transformation does not take place, and Drs. Fraser and Mitchell assure me that throughout the whole of their investigations they have never come across transitional types, and they have never had any difficulty in determining whether the disease was of human or bovine origin.

As regards the more important portals and channels of infection, the researches of Drs. Fraser and Mitchell support the view that in this country infection takes place in the adult mainly through the respiratory channels, while in children it more frequently takes place through the alimentary tract. This view is strongly supported by the feeding and inhalation experiments of Cobbett.

Nathan Raw's hypothesis that practically all surgical tuberculosis is of bovine origin cannot be admitted, as Dr. Fraser found that 38 per cent. of the tuberculous bone and joint cases contained the human bacillus; and, as already mentioned, in no less than 71 per cent. of these one or other parent suffered from pulmonary consumption. It is not surprising, therefore, to find that surgical tuberculosis is also met with in countries where cow's milk is not consumed.

I must confess that, having regard to the present inadequacy of the control of the milk supply, it has always been a matter of surprise to me that the medical profession in this country should still encourage the use of raw milk in the bringing up of infants and young children. Professor Delépine has shown that at least 10 per cent. of the milk supply of our large cities is tuberculous. There can be no doubt, therefore, that under the present unsatisfactory legislative control of bovine tuberculosis and of the milk supply, sterilization of the milk is the only reliable prophylactic measure we possess if we wish to safeguard our children against acquiring bovine tuberculosis. There is good reason to believe that we have more surgical tuberculosis in our large cities than in most European countries, and the explanation is no doubt largely due to the fact that there still exists a strong prejudice against sterilizing the milk in this country, whereas in France and Germany, for example, it is almost the universal practice to do so.

From the point of view of prophylaxis it is satisfactory to know that the Government of this country is at last becoming alive to the fact that bovine tuberculosis is a real source of danger to the community. That the Board of Agriculture and Fisheries and the Local Government Boards for England and Scotland now propose to make a really serious attempt to grapple with the evil is shown by the Tuberculosis Order which has recently been issued. It is to be regretted, however, that the Milk and Dairies Bills have again been shelved to make room for more contentious but less important legislation.

With regard to the Tuberculosis Order, which came into force on May 1st of this year, it is to be hoped that the veterinary practitioners throughout the country will assist in loyally carrying out the Order by notifying the local authorities of any cow they may come across in the course of their private practice which is suffering from "tuberculosis of the udder, indurated udder, or from tuberculosis with emaciation."

In grappling with the milk question, it is to be noted that an important effect of the Milk and Dairies Bills will be to obtain the sanction of Parliament to give powers to the Local Government Boards to force the local authorities to carry out the provisions of the bill.

Once again let me point out that many of the cases of surgical tuberculosis which are admitted into the children's hospital come from remote rural districts where only single cows, or small herds, are kept. Moreover, they are often old cows, and hitherto they have almost entirely escaped inspection. It is earnestly to be hoped, therefore, that by means of the Tuberculosis Order of the Board of Agriculture and Fisheries and the Milk Bills the community will shortly be provided with a uniform and thorough system of inspection and control of dairy cows, and of the milk and milk products which are consumed throughout the country.

I have long been convinced that the reason why surgical tuberculosis is so prevalent amongst the children in this country is (1) because of the prevalence of tuberculosis amongst dairy cows, and (2) because it is the exception rather than the rule to sterilize the milk. Now that notification of all forms of tuberculosis is compulsory, and now that the Tuberculosis Order has made provision for a uniform veterinary inspection of cattle throughout the country, it will be interesting to compare the incidence of tuberculosis in the cows with the prevalence of surgical tuberculosis in the children of the corresponding districts. This is neither the time nor the place to discuss the details of the Milk Bills and the provisions of the Tuberculosis Order, but I should like to point out that, in this country at any rate, both are essential if we are to make any real headway in our warfare against surgical tuberculosis. In my opinion, the stamping out of bovine tuberculosis amongst dairy cows will, in the long run, prove to be a more economical method of dealing with surgical tuberculosis than the building of special hospitals for its treatment. The treatment of surgical tuberculosis by conservative means is, on account of its long duration, a very costly procedure, hence the maxim that "Prevention is better than cure" applies with particular force to tuberculosis.

Unfortunately the stamping out of bovine tuberculosis will take time, and until we have a more perfect system of segregation of human consumptives we shall still have to make provision for the treatment of surgical tuberculosis due to the human bacillus. It is to be hoped, therefore, that an adequate proportion of the money provided by the National Insurance Act for treating tuberculosis will be devoted to providing country hospitals for the treatment of surgical tuberculosis by conservative means. Moreover, there should be an endeavour made to co-ordinate the work done in such institutions with that which will still remain to be done in our large general and children's hospitals. When operative treatment is called for in surgical tuberculosis, it is hardly necessary to point out that this ought to be carried out by skilled surgeons with special experience in this branch of surgery. Cases requiring such treatment will either have to be transferred to a general hospital for operation and then return to the country hospital for convalescence, or a consulting surgeon will have to be appointed to do the operative work in the tuberculosis hospital. I mention this merely to show that it will be impossible to divorce altogether the work done in the tuberculosis hospitals from that which is at present being done in our large city institutions.

It is to be hoped, however, that by the erection of properly equipped country hospitals for the treatment of surgical tuberculosis by conservative means fewer radical operations will be called for. Moreover, there can be no doubt that by the increased facilities and more prolonged supervision which such institutions will afford, still better functional results will be obtained in the cases which still require to be operated on.

Seventeenth International Medical Congress.

THE SECTIONS.

SUMMARY OF PROCEEDINGS.

STATE CONTROL OF VENEREAL DISEASES.

THERE is no doubt that future syphiliographers will regard the great meeting which took place at the Albert Hall on Saturday morning to discuss and vote upon the two resolutions afterwards solemnly put by the Chairman (Sir Malcolm Morris) as an historic occasion. The meeting was in form a joint session of the Sections of Dermatology and Syphiligraphy and of Forensic Medicine, and there were assembled there in large numbers the most eminent authorities on syphilis of the day, both British and foreign, and the opinions voiced and the experiences related must rank as of the highest value both for the regulation of public opinion and for the guidance of the Legislature.

Professor A. Blaschko (Berlin), who is regarded as one of the most experienced syphilologists on the Continent, was the first to sound the note which rang through the speeches of all the fifteen authorities who followed him. There must, he said, be no compulsion. The police were the guardians of the peace and the natural enemy of the criminal; they were not the arbiters of public morality, which it should be the duty of a bureau of public health to control and administer. He gave details of the National Society for the Prevention of Venereal Disease, which, in conjunction with Professor Neisser of Breslau, he had founded in Germany in 1902. This society had grown enormously in late years, and had branches in all the largest towns. It was consulted by legislative and other puplic bodies in all matters relating to venereal disease and the public had come to recognize and appreciate its great utility. Some such institution could not fail to be of the greatest assistance in the consideration of the British problem, and would come in time, as it was now in Germany, to be looked upon as a sort of permanent voluntary Royal Commission for the investigation and elucidation of all venereal problems. The regulation of prostitution had not, in his opinion, proved an effectual means of diminishing syphilis and gonorrhoea in any country, chiefly because the most dangerous kind of prostitute—the young woman of 18 to 25 years—was seldom crippled by her malady, and could usually conceal her infectivity. All regulations of this category should be applicable to both sexes, for it was often forgotten that the men represented a larger and therefore more dangerous source of infection than the women. No system should be employed which publicly and officially labelled the individual as a prostitute, nor should any coercive measures be employed except in the case of the very young or the weak-minded and depraved, who should be controlled in State institutions for treatment, and for reformatory education where possible.

Professor Finger (Vienna) followed this eloquent pronouncement on similar lines. He said that prudery must vanish before a sensible discussion of the whole subject could take place, and he laid particular stress on the importance of forcing the patient to realize the great danger he was to the community as long as he remained untreated. Reform was absolutely necessary not only in the education but in the dwelling-places of the very poor, whose young children were often eye-witnesses of most abandoned scenes of moral depravity. In no country were there sufficient hospital beds to meet the demand for the treatment of venereal disease, and everywhere the treatment was far too short, chiefly from the lack of funds. He did not believe in compulsion, and was most pessimistic as to the results which might be expected from the medical notification now on trial in Denmark. The only measure which would meet the case was, in his opinion, a limited confidential notification, not to the police but to the members of a sanitary bureau.

In the unfortunate absence, owing to ill health, of Major French (R.A.M.C.) his paper was read by Dr. Brend. A good deal in his paper coincided with the views previously expressed by Blaschko and Finger. His results in the treatment of syphilis in the British army, which are well known to everyone interested in the subject, have been published in the *Journal of the Royal Army Medical Corps* and elsewhere, and it may be stated here that Continental authorities have the very highest opinion of the excellence of his work in India, to which reference is continually being made in the foreign literature. In the contribution he had prepared to the discussion he emphasized the importance of bringing concrete and undivided proposals before the Legislature, for in this way only could material results accrue. His proposals included the medical notification of disease, the suppression of *souteneurs* and public prostitution, the protection of orphans and destitute children, the provision of more hospital beds, the establishment of professorships at large hospitals, and the better instruction of students and the general public.

The last of the four "reporters" was Professor Gaucher of Paris, who thought that any sort of State measure should apply equally to both sexes, and should not imply compulsion, which was bound to lead to concealment and escape of the most dangerous type of infected individual.

Professor Leredde (Paris), who began the general discussion, confined himself mainly to a recital of the various ways in which syphilis might affect the human organism, instancing disease of the organs of sense—eye, ears, etc.—the heart, and the vascular and nervous systems. He believed it to be the most potent cause of abortions, stillbirths, and infant mortality.

He was followed by Professor Pontoppidan (Copenhagen), who explained the measures which had superseded the compulsory system in vogue in Denmark prior to 1906. At the present time notification of venereal disease by both patients and doctors was encouraged but was not compulsory, and there had been an enormous increase of attendances both for notification and treatment. He did not, however, believe that statistics would show as yet any decrease in the actual number of fresh infections per annum. It would mean many more years of work before this could be effected.

Dr. Carle stated that the non-coercive measures recently introduced in Lyons had more than doubled the voluntary annual notifications for diagnosis and treatment, while Dr. Max Müller (Metz) emphasized the difficulty of regulation measures on the ground that only a very small percentage of the prostitute class could actually be controlled. A similar view was taken by Dr. Dundas White (London), who asked his hearers not to forget that gonorrhoea accounted for at least three times as many of the annual 500,000 fresh infections with venereal disease as syphilis—and that any sort of legislation ought, therefore, to include both diseases.

A valuable contribution was that of Mr. Ernest Lane, the senior surgeon at the London Lock Hospital, whose experience with venereal disease began with his appointment there in 1878. He urged the importance of the education of public school boys, for many cases of first infection among them occurred from ignorance of the terrible risks they ran. A better training for the student, the general institution of hospital night clinics, as now obtaining at the Lock Hospital, and better facilities for the administration of salvarsan were the chief measures advocated by him. Dr. Helen Wilson (London), Dr. Dubois Havenith (Secretary of the last International Congress on Venereal Diseases in Brussels), and Dr. Horace Vinrace (London), who with Dr. Helen Wilson did not admit the necessity for notification, forced or voluntary, also added some valuable remarks to the discussion.

One of the most notable speakers in the debate was Dr. Woods Hutchinson of New York, a nephew of our late lamented and revered Sir Jonathan Hutchinson. He insisted on some kind of notification, which in the form of an anonymous communication by the doctor was rendering excellent service in New York, where as many as 150 fresh cases of luetic infection now applied daily for relief. In view of the fact that salvarsan sterilized the patient within forty-eight hours, it was an absolute duty to utilize the most stringent means to get hold of the cases before they had spread their disease to the innocent and the guilty. Coercive measures were only indicated, he said, in the case of the incorrigible or the feeble-minded,

and should include segregation, education, and treatment where necessary. He was the only speaker to lay stress on the absolute necessity of prefacing all hygienic measures with a determined attempt to break up the ring of organized and "respectable" exploiters, who both in this country and abroad had made and were making their fortunes out of the feeble-minded and indigent among women and the temporary frailties of man. That was the true "spring" of prostitution—not the sexual impulse!

Sir Malcolm Morris concluded the debate by a most eloquent appeal. He said that "the question was international not merely in the loose sense that the problem of staying the spread of the disease was one which all civilized nations had to face, but also in the stricter sense of the term. These were days in which no nation lived to itself. The facilities of transit and communication were all to the good in promoting commerce and amicable intercourse between the nations, but they also made it easy for those trading in vice to transfer their operations from one country to another. Within the last few weeks a movement, in which he might claim to have taken a part, however insignificant, had been on foot to prevail upon the British Government to appoint a Royal Commission to make a thorough inquiry into the venereal diseases, and after the declaration made in his graceful speech on Tuesday evening by so influential a Minister as Lord Morley, it might be hoped that the appeal would not be fruitless. As far as this country was concerned a thorough official investigation of the subject was the prerequisite of any effectual action on the part of the State to deal with what Lord Morley characterized as this hideous scourge. The facts had to be elicited, the vast prevalence of the disease, the ease with which it could be communicated, the enormous number of those who were its innocent victims, its grave consequences unless promptly and effectually treated, the means now available for its diagnosis and treatment, and the utter inadequacy of existing facilities for making proper use of those means. Of these facts the general public were almost entirely ignorant, and they were most imperfectly appreciated even by our legislators. These facts must be placed upon authoritative record, and then they must be pressed upon the notice of all who claimed to be in any sense leaders and teachers of the people—statesmen and politicians, the judiciary and magistracy, the press, the clergy, the teaching profession, and the members of the local government authorities. An end must be put to the silence in which the subject had too long been shrouded. While the nation had slept the enemy had been sowing his tares. What a monstrous, staggering anomaly it was that we were confronted with! In this country the State enforced the notification of many infectious diseases, took charge of the insane, encouraged the authorities to build fever hospitals, carried out a rigid inspection of factories and workshops, and in a thousand other ways stretched out its long arm to safeguard the health of the community. Yet it did not lift a finger to protect the nation from a devastating disease, which, more ruthless than the destroying angel who slew the first-born, smote the unborn babe. In some countries the State was more mindful of its duty in that regard, but there were few if any in which its action could be said to be adequate and effectual. Sir Malcolm Morris then referred to the example set by Australia. The resolutions submitted, he concluded, embodied the irreducible minumum of what they had a right to call on all the civilized Governments of the world to do.

Resolutions.

Sir Malcolm Morris then put the following two resolutions to the meeting, and they were both carried, the second unanimously:

> That, sensible of the ravages wrought by syphilis in the health of the community, and deploring the inadequacy of existing facilities for checking its dissemination, the International Medical Congress calls upon the Governments of all the countries here represented:
>
> 1. To institute a system of confidential notification of the disease to a sanitary authority, wherever such notification does not already obtain.
> 2. To make systematic provision for the diagnosis and treatment of all cases of syphilis not otherwise provided for.

ETIOLOGY AND PATHOLOGY OF CANCER.

THREE sections were occupied at various times in the discussion of the etiology and pathology of cancer. On Friday there was a discussion of the combined sections of Chemical Pathology and Bacteriology and Immunity, and on the opening day of the section of General Pathology and Pathological Anatomy several papers on cancer were read.

The combined session of the Sections of Chemical Pathology and Bacteriology and Immunity was held under the chairmanship of Dr. Gowland Hopkins on Friday morning. Although little that can be regarded as new was brought forward, various aspects of the cancer question were dealt with by those best qualified to speak with authority, and the record may be regarded as a landmark of our knowledge at the present. As Dr. Lazarus-Barlow put it, the kaleidoscope underwent many changes, and, while it was somewhat bewildering to the audience for the current of thought to be so frequently switched off to permit of another set of ideas to be developed, this very frequent introduction of new points of view was not without its advantages.

Dr. E. F. Bashford opened the discussion by an admirable exposition of the experimental study of cancer. His thesis resolved itself into the assertion that cancer occurs in practically every phase of life and every species as an indirect result of chronic irritation; but what the direct or actual cause of the disease might be he was not prepared to state. He was little inclined to accept the existence of a "cancer parasite," not only because the disease presented very many essential differences from those diseases which are recognized as infective, but also because it was, in his opinion, difficult to conceive that a parasite could produce proliferation at one time in the epithelial or glandular cells and in their stroma, and at another in the connective tissue. In many strains of tumour he had been able to develop sarcoma out of a carcinoma, and when a mixed tumour was further propagated it was possible to preserve one or other element at will, while the second retrogressed and disappeared. The only common property of malignant tumours was the cell itself, and he was inclined to believe that the cause which led to the proliferation and unbounded growth was some of those subtle chemical or biological agents, of which Professor Schäfer had spoken on the previous day. Turning to the subject proper of his address, he showed by means of numerous excellent lantern slides the possibilities of artificial immunity induced in mice and rats. The chief means utilized were the absorption of an implanted tumour which had failed to grow progressively, and which after its disappearance led to a more or less complete resistance to the same strain of tumour in the same species. Embryonic skin, blood and other tissues of the same species gave rise to a still more complete resistance or immunity. On the other hand, he was able to show that those agents which destroyed the vitality of the cells of the graft, sufficed to prevent the production of the immunizing power. Radium, grinding, cold, and similar processes were destructive to the immunizing processes. In order to gain a clear idea of the processes in question, he demonstrated the changes which evolved in a transplanted graft up to the time of the full development of the tumour, and supplemented this account by one of the fate of simultaneous implantation of tumours of different characters. He spoke of the resistance to heterologous inoculations, and showed that heterologous immune serums were devoid of all action in the living body. Passing on to the influence of sex, age, and heredity, he gave a summary of the data he had collected both statistically and experimentally, all of which, however, have been published in the reports of the Imperial Cancer Research Fund. He warned his audience that the immunizing experiments and the results obtained were not to be regarded as indications of "cures" or even protective measures to be applied to human beings. Much work remained to be done before any of these matters could be applied to clinical uses. His address was greeted with considerable applause.

Dr. Freund (Vienna), who spoke in German, dealt with the chemical aspect of the subject. He had set himself the task of determining the essential differences between the constituents of normal tissues and those of new growths from a chemical standpoint. In a previous communication he had shown that in carcinoma carbohydrates and in

sarcoma peptones were considerably increased as compared with normal tissues. Many indications existed which led him to believe that both in the test tube and also in the animal body, influences were at play in the serum which determined the conditions of growth of cells, and which regulated the limits within which cell proliferation could take place. Following out this line of thought experimentally, he had found that the normal blood contained a substance which possessed the power of destroying cancer cells. This substance he had been able to isolate. It was soluble in ether, and did not contain any nitrogen. This fatty acid was not present in the blood in carcinoma, but in its place a substance had been isolated which possessed the faculty of destroying the normally present fatty acid. He maintained that the destructive bodies were present in the blood of every cancer case, and also in the organs. He sought to demonstrate that the fatty acid normally present was deficient in organs showing those pathological conditions which are recognized as precursors of cancer, and he deduced therefrom that the deficiency and disappearance must occur in advance and not as a result of the growth of a cancerous tumour. The abnormal fatty acid of cancerous serum converted glycogen to sugar rapidly, in contrast to the normal fatty acid, but if the glycogen present was first treated with the ether extract, the reverse took place. He was of opinion that chronic irritation or toxic irritation, by destroying the normal fatty acids, produced a predisposition to carcinoma.

The next speaker was Professor von Wasielewski (Heidelberg), who referred to the extraordinary experimental production of malignant tumours by Fibiger, and recounted some observations of a somewhat similar nature, chiefly with *dispharagus* in pigeons and *cnemidoceptes* in fowl. It was, however, not clear how far the tumours observed in these instances were malignant; the speaker taking the position that the differentiation between benign and malignant in this study was not material.

Dr. Lazarus-Barlow held that the etiology of cancer was inseparably associated with the radio-active content of the tissues. Radio-active material was present in larger quantities in cancerous tumours than in normal cells. He exhibited tables which showed that normal tissue contained a quantity of radio-active matter represented by 1, non-cancerous tissues from individuals suffering from cancer contained 25, the primary tumour 51, and the metastases 55; again, gall stones themselves contained considerable amounts of radio-active material, but while non-cancerous gall bladders contained the unit of radio-active matter, the gall bladders of individuals suffering from cancer elsewhere contained five times this amount, while cancerous gall bladders contained eighty-four times the amount. He went still further by assuming that the radio-active element which acted as the determining factor was potassium.

After Dr. Blitz had discoursed on cosmic influences and rather bewildered his audience by digressions, Professor R. Kraus gave an interesting account of his modification of Ascoli's meiostagmin reaction, which he claimed was the only biological reaction possessing a reliable specificity.

Following him came Dr. Clowes, of Buffalo, a man of many parts, who charmed as well as interested his listeners. He was at one with Bashford on practically every point, but would not commit himself in regard to the possibility of a parasitic cause of cancer. He saw no need for the assumption of a parasite, but at the same time he did not feel justified in saying that its existence was disproved by any known facts. He took up the thread of thought started by Lazarus-Barlow, and developed it further. He had found that the virulence of tumours and their rate of growth were directly proportionate to the potassium content and inversely proportionate to the calcium content. This, he considered, indicated a peculiarity in the equilibrium of electrolytes and in the absorption of electrolytes by the cell. Disturbances of the normal equilibrium would modify the permeability of the cell membrane, and would vary the passage of foodstuffs through the membrane for the nutrition of the cell. The equilibrium of the cell was identical with the equilibrium of its membrane, which in its turn meant the equilibrium of the contained lipoids, and this could be expressed as the equilibrium of the electrolytes. In illustration he took the example of fat in water (cream) as compared with water in fat (butter), and then adduced the direct experimental data on which these views had been based. His speech appeared to clear the air of some of the misty statements which had preceded it, and gave a sense of something definite having been recorded in a special branch of thought in connexion with the cancer problem.

Frau Dr. Fuchs von Wolfring of Paris presented an observation which it would seem well worth while to follow up. It was concerned with a precipitation reaction, the standard or basal antigen being prepared from tubercle bacilli and the test serum being that of the patient. It appeared that an inversion of the reaction has been observed in cancerous serums, as compared with normal and with tuberculous serums.

The replies were brief and disappointing. Dr. Bashford did not appear to be inclined to follow the various speakers through the maze of aspects which had been presented, and he summarily convicted those who offered views which did not tally with his own. It was their place to prove; not his to disprove. Dr. Freund also said a few words in reply, and thus a highly complicated, but nevertheless interesting, discussion ended to the satisfaction of each speaker, who maintained that he or she had established the several points beyond dispute.

At the afternoon session of the Section of Bacteriology and Immunity Dr. Leitch read a paper on the potent immunizing effect of the previous inoculation of cancerous material in refractory subjects. Dr. Isaac Levin also dealt with a similar aspect of the same subject.

Cell Variability during the Propagation of Tumours.

The papers read in the Section of General Pathology and Pathological Anatomy were by Drs. Bashford and Murray of the Imperial Cancer Research Fund in London.

Dr. Bashford, in a paper on this subject, remarked on the relation between certain forms of cancer and chronic irritants. The facts were illustrated by the incidence of cancer in certain races which unintentionally performed experiments on themselves by irritating parts of their bodies. The nature of the irritants themselves was of no importance; all that was necessary was that they should be chronic in action. This kept the tissues in a constant state of abnormal proliferation, and by transplanting the cells this could be prolonged indefinitely. He cited numerous experiments showing the variability in cell properties and accentuated the important fact that the property of growth and dissemination were the result of tissues having the power of producing resistance to their own overgrowth.

Heredity of Cancer in Mice.

Dr. Murray (London) gave an account of the studies on the heredity of cancer in mice, which have been published in the report of the Imperial Cancer Research Fund. He detailed the method of breeding and of keeping genealogical histories of all experimental mice. He had found that the majority of cancer cases occurred in mice of which the mother, one or both grandmothers, or mother and both grandmothers, had died of cancer. The incidence of cancer deaths was twice as numerous in animals with a "recent" cancerous history as in those with a remote cancerous history. He concluded that a cancerous ancestry was associated with an increased cancer frequency in the offspring.

INTERNAL SECRETIONS.

ON Friday morning the Section of Medicine held a joint session with the Section of Physiology, to discuss the correlation of the organs of internal secretion and their disturbances. Professor Sir E. A. Schäfer first occupied the chair, later Sir William Osler.

The discussion was opened by Professor E. Gley of Paris, who gave a summary of the various methods by which the existence of internal secretions could be ascertained and demonstrated—histological, physiological, and chemical. He pointed out that in spite of the vast amount of work on the subject that had been published in the last five-and-twenty years, the quantity of our exact and

certain knowledge was still disappointingly small. Too many hypotheses and theories had been formulated. Not only so, but certain discoveries, such as some of those made by Schäfer, had turned out to be positively harmful, by what he adroitly termed *un bonheur malheureux*, for they had misled subsequent workers. He pointed out that a fact which was overlooked by too many of the experimenters who labour in this field of physiology was of great importance. It was this—that it could not be taken as proved that the substances found in the extracts made from organs were actually present in those organs during life. These extracts were often highly toxic, he said, yet it must not be rashly assumed that the toxicity was due to specific substances secreted by the organ. The toxicity here might depend upon many conditions, and most of all upon the method by which the extract had been prepared. Among other topics he discussed the newly-discovered property of tachyphylaxis, exhibited when, as sometimes happens, an animal's tissues acquire the property of resisting a second toxic injection within a few minutes or hours, while the first injection had found these tissues unprepared and open to attack. The reciprocal actions of the ductless glands were of course, he admitted, extremely complex and hard to disentangle; for solution of these problems he looked to laborious physiological and clinical work in the future.

Several succeeding speakers—Professor Biedl (Vienna), Professor von Korányi (Budapest), Professor F. Kraus Berlin)—read papers dealing with generalities and matters of detail that do not lend themselves well to compression.

Professor Cushing (Harvard), whose Address in Surgery will have been read with interest in our last issue, gave an admirably clear and well-illustrated account of much of his own experimental and clinical work on disorders of the pituitary body. He exhibited pictures of dogs from whom the hypophysis had been removed, and followed them up with pictures of human beings presenting very analogous—*mutatis mutandis*—features and syndromes. The adiposity and infantilism characteristic of Fröhlich's syndrome might, to some extent at any rate, be inherited. A lantern slide was exhibited showing a grandmother and a mother who both presented several of the outward features of the syndrome; while the daughter, just the sort of child one would have expected from such an ancestry, exhibited the syndrome in all its completeness. Professor Cushing brought a new type of dyspituitarism to the attention of his audience. The patients of this type are thin instead of being fat, but exhibit the same loss of the secondary sexual characters (though perhaps by retrogressive change) as the patients of the commoner adipose type. He made reference to several other types of dyspituitarism, and showed how in some the disease had been diagnosed as myxoedema, and had received the treatment appropriate for that condition without benefit. He had found that the administration of pituitary extract improved these patients, and he took such a therapeutic success to be evidence of the correctness of his diagnosis. Another patient, a girl of 6, looked as if she was 16 years old. She had menstruated from the age of 2, and her secondary sexual characteristics had made their appearance when she was 3. He pointed out in conclusion that further researches into the functions of the pituitary gland would very likely throw light upon the physiology of sleep. Research had already done something to illuminate the part played by the gland in hibernation.

Other points in the correlations of the ductless glands in both health and disease were brought out by other speakers, including Professor Herring of St. Andrews, Dr. Falta, Dr. Blair Bell of Liverpool, Professor Swale Vincent, Professor G. Murray of Manchester, Professor Morsaline of Buenos Aires, and others.

In replying to and commenting on a number of the points raised during the discussion, Professor Gley took occasion to emphasize the fact that hyperplasia of a gland—of the suprarenals in granular kidney for example—was not necessarily equivalent to its functional hyperactivity, an assumption too often made.

The hall in which this joint meeting took place was crowded to its utmost capacity, and the discussion maintained an unusually high level of excellence and was most interesting.

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CARDIOLOGY AND CARDIOPATHOLOGY.

The Excitatory and Connecting Muscular Systems of the Heart.

It would be probably correct to say that in no branch of medicine has more sure and pronounced advance been made during the last decade than in cardiology. Fortunately there were at the Congress almost all those who have been most closely associated with this advance, an advance which, moreover, it is interesting to record, has been made by workers along a large number of converging lines. We missed, however, the presence of Gaskell and James Mackenzie, who might perhaps be rightly regarded as the two pioneers in this new knowledge.

On Thursday a conjoint meeting of the Sections of Anatomy and Physiology and General Pathology and Pathological Anatomy discussed the excitatory and connecting muscular systems of the heart. There was a large attendance, which included Professor His and Professor Stanley Kent, both of whom were specially concerned in the discussion, inasmuch as it centred round the muscular bundle which they had first described, long before it was recognized as having any important bearing on the function of the heart.

Professor Arthur Thomson occupied the chair. The discussion was opened by Dr. Ivy McKenzie (Glasgow), who addressed himself to the morphological side of the question, to the phylogenetic development of the auriculo-ventricular bundle in fish, reptiles, and mammals. He illustrated his remarks by numerous lantern slides. He pointed out that in such closely related forms as the cod and the halibut there was a marked difference in the ease with which the bundle could be distinguished. Its nerve supply was always rich. The sinu-auricular node and the auriculo-ventricular node and bundle had their homologues in the various vertebrate hearts. In the fish they were in the form of rings of specialized muscle surrounding the sinu-auricular and auriculo-ventricular orifices. They became transformed from rings to large spindles as a result of the morphological changes in virtue of which the heart became divided for the propulsion of arterial and venous blood. The sinu-auricular spindle was derived from the original sinu-auricular ring, and the auriculo-ventricular spindle was probably derived partly from sinu-auricular tissue and partly from auricular canal; the former derived its main nerve supply from the right side and the latter from the left. Their function was associated in some way, as yet unexplained, with the co-ordination of the cardiac movements.

Dr. Josué (Paris) continued the discussion with a summary of the work on cardiac localizations. He pointed out that the idea of cardiac localizations was new. Originated by physiology, they had been discovered afresh in human pathology. The idea dominates all the clinical history and pathological anatomy of myocarditis. It explains how the symptoms during life are not always comparable to the myocardial lesions found after death. In truth, the site of the lesions is of more importance than their extent. The small fibrous scar interrupting the bundle of His will have more serious consequences than a much larger lesion situated in the anterior wall of the ventricles. We have passed in review the manifestations which permit the localization of lesions in the cardiac muscle. We have studied the disorders which characterize the appearance of abnormal starting points of the cardiac systoles and those which indicate the interruption of the conducting bundle. We have examined successively the embryological relics of the primitive cardiac tube, portions which have been specialized with a view to the production and transmission of cardiac contraction and the remainder of the myocardium. Cardiac localization should be considered as localization of function. That we have been able to localize disorder in a particular region of the heart does not permit us to say that we shall certainly find the material lesion in that spot. The functional disorder is situated in a precise region of the cardiac muscle, but it is not always easy to say in what measure it depends on a local lesion or is due to some other cause, such as influence of the nervous system.

Dr. T. Lewis, in summarizing the present knowledge of the site of origin of the mammalian heart beat, said that the evidence was now conclusive that the normal heart beat arose in the sinu-auricular node, and that this small

structure, lying at the upper end of the sulcus terminalis, controlled the beating of the whole heart. Heart beats started artificially in this region alone resembled the normal heart beat. By studying the heart with the string galvanometer, it could be shown that the electrical relations of this node were peculiar. The current accompanying the excitation process began in this region, and spread from it throughout the auricular tissue; these facts alone were sufficient to localize the tissue responsible for the starting of the contraction wave. Complete confirmation had been obtained by the method of heating and cooling. The same region gave an exquisite response to warm or cold applications, and far more sensitive than any other structure in the heart, giving immediate alterations of the rate at which the contractions followed each other. The long search for this pacemaker might be regarded as successfully closed.

Professor Külbs (Berlin) reported the results of his examination of the auriculo-ventricular bundles of the heart. He found that these muscular tracts could be histologically distinguished from the typical heart muscle much more easily in mammals than in birds, and more easily in birds than in fish, amphibia, or reptiles. He showed that the arrangement of these bundles became more complicated as the heart evolved from the simpler forms. He divided the bundle system into three distinct portions, namely, the Aschoff-Tawara node, the bundle of His proper, and the fine ramifications of the bundle to the apex of the ventricles.

Professor Stanley Kent (Bristol), whose researches were among the earliest some twenty years ago, referred to the histological features of the neuro-muscular bodies, which were associated and connected on the one hand with the auricular musculature, and on the other hand with the ventricular musculature. Dr. Bishop (New York) attributed many cases of heart-block to autointoxication, and expressed the opinion that such intoxication was particularly prone to occur from deranged metabolism after accidents or severe illnesses. Dr. Hering described further neuro-muscular structures which he had met in the neighbourhood of the auriculo-ventricular junction; while Dr. Louis Rénon laid stress upon the richness of elastic fibrillae in the bundle of His. He also gave a number of practical suggestions as to the best way of demonstrating the bundle, the best methods of fixation, of opening the heart, and of staining the sections.

Dr. Morrison described the abnormal appearance and distribution of the bundle in a malformed heart, and Dr. Lea suggested that other functions than those of conductivity must be assigned to the bundle of His, and that changes elsewhere might affect the conductivity of the muscle, judging this from cases in which changes had been found in the ventricle.

Professor His stated that he had brought the original specimens and pictures bearing on his discovery.

Professor Keith, remarked that although the anatomy of the auriculo-ventricular bundle was known, knowledge of its function was far from complete. Function ought always to explain structure, and this had not been so in the case of the bundle of His. Hence he felt sure that it must have some more complicated function than that of merely transmitting the beat. Discussing the excitability of nodal tissue, he suggested its occurrence elsewhere, and, indeed, had found similar tissue in the ileo-caecal region and at the cardio-pyloric junction, which suggested some association with the originating of rhythmical contractions at these parts.

Dr. Muskins was of opinion that even in so restricted an area as that of the sinu-auricular junction it was possible to make, physiologically, differential subdivisions.

Dr. Hirschfelder recorded an observation he had made of the independent contraction in the frog's heart of the auriculo-ventricular bundle, a contraction which followed that of the auricle but preceded that of the ventricle. In hearts, however, poisoned by aconite for the purpose of obtaining extrasystoles, the latter could be observed to begin as co-ordinated contractions of the auriculo-ventricular ring, and to pass in both directions to auricle and ventricle, which chambers then contracted simultaneously as in the extrasystoles of the mammalian heart, which have been correctly assumed to have their origin in the auriculo-ventricular bundle.

Professor Aschoff (Freiburg), who paid a graceful tribute to the pioneer work of the English school, described three main centres for cardiac contractility—the sinus node, atrium node, and ventricular node.

Professor Wenckebach (Strassburg) acknowledged his debt to clinical observers. He attributed many cases of abnormal heart beat to defective ventricular excitability, and was of the opinion that the cardio-motor mechanism was much more than the remains of the auriculo-ventricular ring, and that we were still a long way from understanding the structural basis of clinical phenomena.

Professor Waller drew attention to the correlation of the size of an animal, its pulse-rate, and the length of the auriculo-ventricular interval, instancing the horse, man, and the dog. He showed that after violent exercise, when the pulse-rate was high, the auriculo-ventricular interval was shortened, and that the interval became prolonged as the heart recovered its normal frequency.

In replying, Dr. Ivy McKenzie agreed that conductivity was not the sole function of this bundle and that all abnormal contraction arose in nodal tissue. The discussion formed a striking example of how varied are the aspects from which disease can be studied, for in it participated embryologists, anatomists, comparative anatomists, physiologists, and clinicians.

At the close of the discussion, Dr. Koch (Berlin) contributed a paper on the pathology of the bundle system of the heart. Owing to the frequent introduction of the mechanical or nervous factor, in addition to the factor of the local lesion, it was, he said, far from easy to associate definitely anatomical and clinical conditions. It was, for instance, impossible at present to associate any definite anatomical condition with auricular fibrillation, which appeared to depend upon some more or less temporary defect in the cardio-motor mechanism.

The Pathology of Heart Failure.

A first-rate discussion on the pathology of heart failure was held during the morning session of the Section of Medicine on Saturday. It was opened by Professor H. Vaquez of Paris, who began with an account of the various methods of clinical investigation that tell when heart failure is to be expected or diagnosed. The chief of these, he said, were acceleration of the pulse-rate, fall in the arterial blood pressure, changes in the cardiac rhythm (and particularly the appearance of certain forms of irregularity), alterations in the form of the tracings furnished by the electrocardiograph. He was particularly anxious that the talented employers and interpreters of the electrocardiograph should not permit zeal to outstrip discretion, and should not attempt to draw from the electrocardiogram deductions more precise than present knowledge warranted. Professor Vaquez thought that examination with the x rays, especially when repeated from day to day, gave more valuable information about heart failure than any other method of examination. He went on to point out that failure of the heart might be either partial or total, and might affect different chambers of the heart in different cases. Thus failure of the auricles was not rare in mitral disease, and often really seemed to make little difference to the patient. Failure of one or other of the ventricles of the heart was commoner; failure of the left ventricle was the cause of those distressing palpitations and attacks of painful dyspnoea that frequently occurred towards the end in severe cases of heart disease, and often brought with them sudden death. Primary failure of the right ventricle, contrariwise, was characterized by quite other features—painless shortness of breath on exertion, with only a slight increase in the rate of the pulse. Total cardiac failure involving all four chambers together was rare; it might occur in healthy persons after prolonged and violent muscular exertion—in Marathon runners, for example. But it might also occur, oddly enough, in the pothouse patrons of such athletes, a form of slower onset seen in those who drank vast quantities of beer (the Munich or Tübingen beer-heart, so called).

Why was it, Professor Vaquez asked—and the next speaker, Professor Wenckebach, repeated the question—Why was it that prognosis in cardiac disease was so often unsatisfactory, or even totally wrong? Because of debility of the heart muscle, they believed, and our inability to form any correct clinical estimate of the

degree of this debility. Arrhythmia had been pointed to as an index of the impairment of cardiac muscle, but this was a mistake; arrhythmia indicated impaired cardiac mechanism, and told us nothing about the functional competence of the muscular substance of the heart. In fact, our only way of estimating the reserve power of the myocardium was the very unsatisfactory one of watching the progress of the malady. Professor Wenckebach expounded a method of measuring the reserve of cardiac power by estimations of the contractility of the heart muscle; the method, however, though of great theoretical interest, did not admit of any practical application at the bedside.

Dr. W. T. Ritchie of Edinburgh next drew attention to "auricular flutter," a condition akin to the auricular fibrillation that has been brought so prominently to the fore by the electrocardiograph. When fluttering, the cardiac auricles beat from 200 to 350, or even 380 times a minute; the ventricles often followed at only half those rates. He quoted cases to prove that neither auricular flutter nor auricular fibrillation deserved the gloomy connotation so commonly ascribed to them. They might last for years without harming the patient, and their establishment might even be associated with improvement in his general condition.

Dr. L. F. Bishop of New York struck out a new line of thought by attributing heart failure to protein poisoning, and proposing to treat it by dieting and exhibiting repeated full doses of castor oil. Dr. Haig of London attributed heart failure to uric acid and nothing else. Of the other speakers several drew attention to the care that should be exercised in giving a bad prognosis in cases of morbus cordis. To diagnose "weak heart," as was so often done, was almost always wrong, as Professor Thayer of Baltimore pointed out. Dr. Walsh of New York emphasized the importance of encouraging cardiac patients to think as well of their physical condition as possible. The influence of the mind upon the body was particularly well marked in these patients; to give them a bad prognosis was simply to dishearten them, and the physician was justified in giving the best prognosis he could, or even better still, to the victims of morbus cordis, a sentiment that was much applauded.

Subacute Bacterial Endocarditis.

When this discussion was over Dr. E. Libman of New York read an interesting and very complete account of a new form of subacute bacterial endocarditis, which his researches had enabled him to isolate from that refuse heap of unclassified cases known as "malignant endocarditis." His form of endocarditis occurred mostly in persons who had already got chronic valvular disease—a fact that might suggest a relapse rather than an infection with a new variety of microbe. The cases lasted for from four to eighteen months, and the great majority ended fatally; a few spontaneous recoveries and a few recoveries attributed to various forms of treatment had, however, been recorded. The microbe causing the endocarditis he had isolated in 73 out of 75 cases; it was almost always a streptococcus of a peculiar type, intermediate between the pneumococcus and the ordinary streptococci, and he proposed to name it the *Streptococcus mitis*. A special form of glomerular nephritis was characteristic of this new variety of endocarditis, and this was illustrated by lantern slides and explained by Dr. Baehr of New York, who was associated with Dr. Libman in his work. Special interest attaches to this form of heart disease, because, as Dr. Poynton of London pointed out, it seemed to be very closely connected (if not, indeed, identical) with a form of rheumatic endocarditis described by himself and Paine in 1900. So far as Dr. Libman's investigations went, however, it appeared that *S. mitis* was not the same as the strains of the rheumatic diplococcus he (Dr. Libman) had been able to lay his hands on for purposes of comparison.

Other Papers on the Heart.

The afternoon session of the Section of Medicine was devoted to the reading of a series of papers on cardiac subjects. Dr. J. Cowan of Glasgow gave an account of half a dozen cases of nodal rhythm and heart-block occurring during the course of acute infectious fevers, and Dr. A. E. Cohn of New York described some of the effects of digitalis on the heart. A new and simple—or fairly simple—method of obtaining simultaneously tracings of the arterial pulse, the venous pulse, and the heart sounds was explained by Dr. R. Ohm of Berlin. In this, as in the previous papers, free use was made of a projection apparatus and screen. Dr. Ohm's tracings showed clearly that his apparatus would be of considerable assistance in the diagnosis of certain forms of valvular heart disease, and also for didactic purposes.

Experimental Study of Rheumatic Endocarditis.

Drs. A. Paine and F. J. Poynton, of London, next presented a summary of their recent work upon rheumatic endocarditis. It was pointed out that the rheumatic diplococcus was capable of producing every form of endocarditis, from the most benign simple variety to the most malignant, in man. And in animals, similarly, every variety of endocarditis could be produced by the intravenous injection of cultures of the diplococci taken from cases of rheumatic fever in human beings. Many forms of non-suppurative arthritis could be produced in animals, and a number of pictures were thrown upon the screen showing the extensive circumarticular fibrosis and inflammation commonly produced; while others illustrated the fact that a typical rheumatoid arthritis, with lipping of the bones and erosion of the cartilages all complete, might result from such experimental infections of the joints in rabbits. A very striking set of pictures illustrated the acute appendicitis that might follow, again in the rabbit, upon the intravenous injection of rheumatic diplococci. Twenty rabbits, 6 weeks old, were inoculated with the organisms obtained from a case of rheumatic fever; 19 developed polyarthritis, 4 appendicitis, 1 endocarditis. Microscopical sections of the inflamed appendices made it obvious that the rheumatic appendicitis of the young rabbit is in every way a replica of acute non-suppurative appendicitis in man. Necrosis of the lymph nodules towards the periphery of the rabbit's appendix was conspicuous, followed by necrosis and disintegration of the greater part of the Lieberkühn's follicles and crypts opening into the lumen of the tube. Dr. Paine laid stress on the rapid phagocytosis of the organisms that takes place in both rheumatic rabbit and rheumatic man. He held that it accounts for much of the difficulty experienced by so many observers in isolating the rheumatic diplococcus from rheumatic patients.

Diagnosis.

Dr. A. D. Hirschfelder (Baltimore) next read his paper on various simple modes of diagnosing circulatory troubles commonly believed to require the use of expensive and complicated pieces of apparatus for their demonstration. Among the points he dealt with was the naked-eye observation of the venous pulse at the root of the neck. By laying the patient horizontal, the internal jugular vein can very generally be made to stand out in relief upon the surface of the neck. Its edge and its pulsations can be thrown into relief by holding the margin of a white visiting card parallel to its course and in close proximity to its border. This white card gives a fixed point that appears to amplify and at the same time define any pulsations that the vein may show. He illustrated the use that might be made of these pulsations in the diagnosis of various forms of irregular cardiac rhythm. For example, auricular extrasystoles can be seen to occur in pairs; ventricular extrasystoles singly, and he noted that these produce extremely large and forcible venous pulsations. In complete heart-block the number of extra-auricular systoles intercalated between the ventricular beats varied in successive diastoles, and was inconstant.

SANITARY ORGANIZATION IN THE TROPICS.

A discussion on sanitary organization in the tropics was held at a joint meeting of the Sections of Naval and Military Medicine and Tropical Medicine and Hygiene on Saturday morning.

It was introduced by Sir Ronald Ross, F.R.S., who said that he would take the word "sanitation" in its widest possible sense to include everything which tended to reduce the sickness and mortality of human beings. He then proceeded to give an outline of what he believed to be the essential features of a successful public health service in tropical colonies. In order to have

the most efficient and least expensive organization for preventing and treating disease in tropical countries, all the departments concerned in sanitation should, he said, be unified under one head. In our present organization the medical department dealt with the treatment, and the sanitary department with the prevention, of disease; the research, statistical, and engineering departments usually carried on an independent existence. To get the best results, all of these departments should be placed under the control of one official, who, moreover, should have a share in the supreme governing body of the colony, as the care of the public health was quite as important to the community as the regulation of its education, commerce, or land defences. The sanitary department was commonly subordinated to the medical department. The Americans in their Panama Canal sanitary organization had reversed this arrangement with excellent results. Research as at present conducted depended largely on the individual investigator's own particular fancy, whereas it should be directed by a central authority and employed to clear up obscure points in the incidence of epidemic diseases of the community. In the matter of statistics again, they were, as a rule, collected by officials who had not had any special training for the post. In order to analyse the results and check statements made by sanitary officers on the basis of their returns expert statisticians should be appointed. The sanitation of municipalities in the tropics presented many difficulties. The teeming native population could not afford to pay for expensive schemes of sanitation. The sanitary authority was usually vested in a board whose members knew little or nothing of the subject and who were much more concerned about local politics and their own financial interests. To deal with epidemics a special service, like the Marine and Public Health Service of the United States of America, should be created, as without centralization and thorough organization epidemics could not be efficiently controlled. One other point which was frequently overlooked was that a sufficiency of trained labour should be provided to carry out the directions issued by the central authority.

The second speaker was Staff Surgeon Dr. Hintze, of the Military Department of the Colonial Office, Berlin, who gave a sketch of the existing medical and sanitary organization in the German colonies. The following points should be of interest to medical officers of other tropical countries. In each colony there was a chief medical officer who had direct access to the governor of the colony and advised the governor on all matters affecting the public health. The executive sanitary officers consisted of Government civil surgeons and of military medical officers seconded from the colonial forces. Those officers underwent a special training in tropical medicine and hygiene at the school of tropical medicine in Hamburg before being selected for employment in the colonies. Subordinate to these officers were a number of European assistants, mainly retired non-commissioned officers from the army, who performed the work of sanitary inspectors; before being appointed to the colonial service they received a course of instruction in tropical hygiene. A few natives were employed in subordinate positions. Each medical officer in charge of a district had to make frequent tours of inspection and keep himself informed as to the general health of the community. For the investigation, treatment, and prevention of sleeping sickness there was a special department, with eight medical officers in German East Africa, four in the Cameroons, and two in Togo. In Dar-es-Salam there was a research laboratory where bacteriological and other examinations were carried out for the Public Health Service. Vaccine lymph was now prepared in each colony; this had led to a considerable saving of expense, as well as yielding much more satisfactory results than were obtained with lymph imported from Germany. The local troops had their own medical organization somewhat on the lines of that of the home army.

The third speaker was Colonel P. Hehir, I.M.S., Assistant Director of Medical Services, Burma Division, who, in a paper on military sanitary organization in the tropics, dealt with the requirements of a sanitary service for large forces in a settled tropical country. He considered the sanitary organization of the army of the Indian Empire to be the most comprehensive, practical, and, as the result showed, the most efficient in existence, and presented it as a model of what military sanitary organization in the tropics should be. He specially emphasized the importance of making combatant officers of units responsible for the sanitary condition of their barracks and surroundings, and the hygienic welfare of troops, and he was of opinion that the institution of regimental sanitary detachments in units had been of inestimable value to the health of the army in India.

An interesting discussion on these papers was opened by Colonel W. G. King, I.M.S. (retired), who criticized Sir Ronald Ross's proposed unification of all branches of the sanitary service, and said that the great aim should be co-ordination not unification. He agreed that central control was necessary to prevent wasteful expenditure, and advocated the appointment of a sanitary officer in each district in India, who should be directly responsible to the Government of the district and not subordinate to the medical department.

Professor Wasielewski (Heidelberg) pointed out that in order to keep up a stock of virulent vaccine lymph in the tropics rabbits could be used equally as well as calves, and were much more convenient to manage in the laboratory.

Professor Agramonte (Cuba) stated that practically every measure which Ross advocated had already been introduced in Cuba, and that the state of the public health there was at present most satisfactory.

Dr. E. Black said that when, some thirty years ago, he was called on to organize a public health department for Western Australia, he began by studying the organization of the British, French, and German colonies, and selected from each what he considered to be the best features, with, as he believed, the happy result that Western Australia now possessed a thoroughly well-organized public health service. The medical and sanitary services were both under central control. The principle observed was that matters which affected the health of all the inhabitants of the country—for example, imported food supplies—should be regulated by the central authority, while those which only concerned the population of a particular locality—for instance, the water supply—should be controlled by the local authority.

Dr. Sandwith said that almost all of Ross's ideal conditions already existed in Egypt; in addition, a veterinary department under European officers had been established and furnished protective vaccine for certain cattle epidemics. The quarantine service was still under international control, and the sanitary department had not as yet a representative on the supreme governing body. Dr. Sandwith laid great stress on the importance of recognizing that the efficiency of Oriental sanitation depended on the co-operation of the village community. Great results were hoped for from the recent ordinance providing an elementary training in medicine and hygiene for the village barber. Dr. Sandwith approved of government by committee, provided the committee was ruled by the medical officer.

Dr. Harford pointed out that no matter how perfect the sanitary organization might be, it could only be a success if all classes of the community co-operated. He had twenty years' experience, in connexion with Livingstone College, in training missionaries for tropical colonies, and he believed that those men while acting as religious missionaries also performed a great service to the native communities by instructing them in the methods and value of sanitation. The importance of giving instruction in sanitation to children attending schools had not yet been grasped in this country. Sir William MacGregor, when governor of a West African colony, inserted sanitation in the curriculum of every school, with most satisfactory results for the health of the natives. One great danger menaced the future of the West African colonies, namely, the alcoholization of the natives, and this question called for immediate action.

Dr. Olpp (Tübingen) concurred in Dr. Harford's testimony to the good work done by missionaries in promoting a knowledge of sanitation among natives. He also referred to the difficulty of getting native women to enter Government hospitals as patients because the treatment was usually carried out by male medical officers.

Dr. Anderson referred to his experience when visiting the West Indian colonies, and deplored the fact that

schemes introduced for the improvement of the health of the community were often blocked because of differences of opinion between the chief medical officer and members of the Legislative Council. He said that all members of the civil service, but especially the Governor of the colony, should have some elementary knowledge of the diseases prevalent in their sphere of government; this would enable them to appreciate the importance or otherwise of proposed schemes of sanitation, and to estimate the benefit which might be expected to result from the proposed expenditure.

Dr. Andrew Balfour (formerly of Khartoum) said that in sanitary warfare, to obtain a victory it was necessary to have good troops, that is, sanitary inspctors; it was useless to train commanders if their subordinates had not the knowledge necessary to enable them to carry out the orders received. Sanitary officers should weigh well the cost of any proposed scheme of sanitation. Sanitary inspectors in the colonial service must have a training not merely in general sanitation, but also in tropical sanitation; this had been recognized by the Sudan Government, and extra pay was now given to men who had been trained in tropical sanitation.

Colonel King then proposed a resolution to the effect that in all fully administered tropical countries the chief sanitary adviser to the civil administration should be subordinate to no other authority than the Government he served. After an animated discussion Colonel King agreed to withdraw his resolution.

ANATOMY AND EMBRYOLOGY.

THE proceedings of the Section of Anatomy and Embryology began in a joint meeting with the Section of Pathology, under the presidency of Professor Arthur Thomson, who welcomed the members in a few well-chosen words. He expressed the hope that the strangeness which many of them must inevitably feel would soon wear off, that they would make many friends, and take away with them the memories of pleasant experiences.

The Sections then turned to the consideration of the business for which they had met—namely, a discussion on the excitatory and connecting muscular system of the heart.

EMBRYOLOGY.

Friday, the second day of the sectional proceedings, was devoted particularly to the study of embryological problems.

It began with a report by Professor Éternod (Geneva) on the earliest stages of the development of the human ovum. The report consisted of a summary of the principal papers published on this subject during recent years. He pointed out the great lacunae in the knowledge of almost every stage of the early development of not merely the human ovum, but of the ovum of primates generally. Until a larger number of specimens had been examined it was necessary to walk with circumspection and humility. The general mechanism of gastrulation was discussed, and the opinion he expressed, after being daily occupied for almost thirty years on the problem, was that the formation of the gastrula by invagination was much the more common method, if, indeed, it was not the only one. Other important subjects brought forward included the phylogeny of the ovum, the trophoblast, the germinal area, the part played by the Vitelline sac, the allantois, placenta, and the vascular areas. Professor Bryce (Glasgow) expressed himself as being in general agreement, although he thought Professor Éternod had perhaps followed too closely the early stages of the development of the frog's ovum in considering those of the development of the human ovum. He himself divided this early period of development into two phases separated by a relatively long interval—the stage of lamination and the stage of notogenesis. He also differed from Professor Éternod in believing that the trophoblast only consisted of two layers; the third or outermost layer which had been mentioned was, in his opinion, of doubtful existence, and if present was most likely maternal. Dr. Jenkinson (Oxford) disagreed with Professor Éternod as to the origin of the entoderm and as to the phylogeny of the blastopore. He agreed with Professor Bryce as to the origin of the yolk sac from the inner mass, the rest of which formed the embryonic knob; he regarded the trophoblast as a precociously developed false amnion. The derivation of the amniotic blastopore from the anamniotic, he thought, was clearly seen in the Gymnophiona. He homologized the embryonic shield of Amniota with the blastoderm of Gymnophiona, the fusion of the archenteron and the subgerminal cavity in Amniota with the fusion of the archenteron and the segmentation cavity in Gymnophiona, and the extra-embryonic zone of blastoderm in Amniota with the superficial yolk cells of Gymnophiona added on to the blastoderm, while the rest of the yolk remains unsegmented.

The President (Professor Thomson) gave a lantern demonstration of twenty-three serial sections through an early human embryo of a computed age of twelve to fifteen days. He laid stress upon the fact that there appeared to be a communication between the amniotic cavity and the exocoelom, which latter could be seen extending on either side in front of and behind the embryo. Another interesting observation was that the Graafian follicle from which the ovum was derived had not become closed at the time of death. The contribution was further illustrated by a model.

Professor McClure (Princeton) read a paper illustrated by photomicrographs and photographs of wax-plate models on the development of the lymphatic system in the trout. He showed that a number of spaces make their appearance along certain lines and at more or less regular intervals in the mesenchyme. Later these spaces joined up with each other to form longitudinally coursing channels—the lymphatics. There might be observed, for example, median and lateral cephalic lymphatic trunks, a lymphatic of the lateral line formed in this way. They were developed at first quite independently of the veins, although later they became connected with them, so that blood passed from the veins into the lymphatics until the valves became formed.

Professor Huntingdon (New York) contributed the results of his work on the genetic relations of lymphatic and haemal vascular channels in the embryos of Amniotes. His views were in harmony with those of Professor McClure as regards the origin of lymphatics from the concrescence of intercellular mesenchymatous spaces, the flattening of the mesenchymatous cells foreshadowing the formation of epithelium. He drew a distinction between the formation of lymphatics in reptiles, in birds, and in mammals. In reptiles they developed in the way already mentioned. In birds the lymphatics in addition seemed to take a considerable part in the formation of erythrocytes, which were borne into the venous jugular confluence; only after the discharge of these contents did the lymphatics assume their adult appearance. In mammalia, on the other hand, the lymphatics appeared first as mesenchymatous spaces around the vessels, and only as these latter shrunk were the spaces converted into definite channels.

Professor Rabl (Innsbruck) read a paper on the development of haemo-lymph glands in the guinea-pig, which again showed the close relation which must exist between veins and lymphatics, especially when some of the latter are described as being blood-bearing. Professor Pires de Lima (Porto) recorded three cases of congenital juxta-urethral fistulae which had come under his direct observation. They had all occurred in medical students. He reviewed the literature of such cases, and explained them by reference to development as due to the persistence of Guerin's sinus.

Dr. Jenkinson contributed a paper on the effect of centrifuging the egg of the frog. He showed that a new polarity was set up and that four zones could be readily identified; at the animal pole were found most of the fats, in the next zone the proteins and glycogen, in the third the pigments, and in the fourth the yolk. As more derangement was produced at the two poles than at the equator, the head and tail regions showed much more deformation than did the more central parts. As, however, the actual tail was developed from the equatorial region, it itself might be perfect. The effects naturally depended on the rate of the centrifuging motion and the period of exposure. Professor Wilson (Sydney) showed a number of stereoscopic photomicrographs through a human embryo with nine pairs of somites. Although the embryo was from an abortion it seemed to be quite

normal, and its tissues had been beautifully fixed. He drew attention to the dorsal flexion and to the series of funnel-shaped apertures through which the pleuro-peritoneal cavity communicated with the exocoelom.

Dr. Marie Loyez (Paris) made a communication on atresia of the follicles and the formation of cysts in the human ovary. She expressed the view that a great number of ovarian cysts did not arise from such atresia, but resulted from an abnormal proliferation of the follicular epithelium of the ovaries, which gave to them a neoplastic character.

In the afternoon Dr. Teacher gave a demonstration of the Bryce-Teacher embryo, and Dr. Jenkinson showed a number of specimens of the embryos of frogs in which the eggs had been centrifuged.

PHYSIOLOGY.

THE first paper on Thursday morning was one by Dr. Dominici (Naples) on the correlation of organs, especially the kidneys and suprarenal capsule and internal secretions. Having observed that the experimental destruction of the liver brought about marked changes in the kidneys and the adrenal bodies, he sought an explanation of the relationship which apparently existed between these different organs. He found that the gradual destruction or removal of the kidney tissue was followed by a diminution or disappearance of the chromaffin matter of the adrenals. Further, he found that the injection of adrenalin into decapsulated animals prolonged life for two or three days. He was followed by Miss Macnaughton (Edinburgh), who read a paper on the fatigue of nerve. She had found that when protoveratrin solution was injected into an animal and a nerve-muscle preparation made, if the nerve were stimulated, fatigue rapidly set in—a fatigue from which there was no recovery. If, on the other hand, the nerve-motor ending were shielded from the action of the drug, although the onset of fatigue was rapid, slow recovery took place. She believed that all the results obtained could easily be explained on a purely physical basis, and that it was unnecessary to conclude that the nerve impulse was a chemical phenomenon.

Professor Macallum (Toronto) then communicated the results of an investigation which he had carried out with Dr. Collip on a hitherto unrecognized substance in nerve cells. Whilst engaged in studying the nerve cells of the leech they found that a reduction of silver nitrate took place in them, giving a characteristic steel-grey appearance. This reaction they found was also given by the cells of the posterior spinal ganglia, the Gasserian ganglion, the sympathetic system, and the cortex. The substance which produced this reduction was always grouped about the endo-cellular canals of the cells. It was never found in the nucleus, and it extended into the dendritic processes for a short distance only. Professor Macallum believed that this substance was closely related to adrenalin, although the two bodies did not quite agree in some of their reactions. It was found that when the medulla of the suprarenal body was tested with the silver reagent it gave a very marked and very diffuse reaction, and, further, that adrenalin itself brought about the rapid reduction of a solution of silver nitrate. In answer to Professor Schäfer, Professor Macallum said he did not think that the substance was the same as that in Nissl bodies.

Professor Lusk (New York) read a paper on the alleged influence of adrenals and thyroid on diabetic metabolism. The paper was founded on experiments carried out in a respiration calorimeter, and showed with regard to the influence of the injection of adrenalin, which, of course, produces a temporary glycosuria, that it had no inhibitory power on the oxidation of sugar in the body, and further that it did not increase protein metabolism. A second series of experiments on the influence of phloridzin before and after thyroidectomy indicated that the injection of the drug before thyroidectomy caused an increase in protein metabolism and a 25 per cent. increase in heat production, whereas after thyroidectomy there was little or no increase in the protein metabolism, and the heat production was unchanged. He believed that the heat production was unchanged owing to the fact that the protein metabolism was also unaffected. He further noted that glycogen retention in the liver and the tissues was much more readily induced after thyroidectomy. Dr. Falta (Vienna), in criticizing this work, maintained that, as regards the carbohydrate metabolism, dogs and men differed so greatly that it was impossible to draw conclusions from experiments on dogs which would be applicable to men. A paper by Drs. Cramer and Krause (Edinburgh) on the relation of the thyroid gland to carbohydrate metabolism supplemented Professor Lusk's. They fed animals on a food rich in carbohydrate and administered small doses of thyroid extract, either fresh or dry. Great stress was laid on the necessity of using fresh or freshly dried preparations of the gland. They found on killing the animals that glycogen was absent from the liver. In twelve thyroid-fed rats glycogen in the liver was practically absent, whereas control animals gave 1 to 3 per cent. The question was, What had happened to the carbohydrate? No glycosuria was ever observed, and there was practically no effect on the blood sugar. On examining the respiratory quotient they found after a meal a respiratory quotient of 0.99, followed by a slow fall, whereas in a control animal without thyroid there was a high initial respiratory quotient which rapidly fell. Apparently the thyroid extract acted in two ways—in so far as it prevented storage of carbohydrate it had an inhibitory action, but it had also a stimulating action, since the oxidation of the carbohydrate was manifestly increased. In connexion with this same subject, Professor Herring (St. Andrews) read a communication on the effects on metabolism in white rats of thyroid and pituitary administered (*a*) separately, (*b*) together. He found that after small doses of thyroid extract, in spite of unlimited food, there was a steady loss in weight which, if allowed to go on, led to the death of the animal. Administration of pituitary extract did not have this effect. Combined administration of thyroid and pituitary extract led to a loss of weight which was not so marked as when the thyroid was given alone. These papers led to a very interesting discussion, in which Professors Falta and Biedl (Vienna), Gley (Paris) and Swale Vincent (Winnipeg) took part.

Sir E. A. Schäfer dealt with the classification of hormones, and contended that the word "hormone," derived by Professor Starling from *ὁρμάω*, to stir up or excite, suggested merely an exciting agent, but that nowadays it was applied in too broad a fashion to all internal secretions, whether excitant or inhibitory in nature. He suggested that a special name was needed for those substances which were inhibitory in action, and offered the word "chalone" (from *χαλάω*, to loosen), leaving the term "hormone" for the excitants. This would necessitate the coining of a comprehensive word to include both hormones and chalones, and for this Professor W. R. Wardle had suggested "autacoid" (*ἄκος*, a remedy). Thus the expression "autocoid substance" would denote any drug-like principle which was produced in, or can be extracted from, the internally secreting organs. A very active discussion followed. Professor Biedl (Vienna) thought that the word "hormone" was sufficient for the the present. Professor Gley (Paris) suggested that "harmosone" (from *ἁρμόζω*, to rule), was a better comprehensive title. Professor Falta (Vienna) desired to classify the hormones into those which were anabolic and those which were catabolic. Professor Starling (London) expressed the opinion that our information was not yet full enough to begin to classify such substances as hormones, particularly as scarcely anything was known about their mode of action.

Dr. Fleischmann (Berlin) read a paper on the nervous regulation of the body temperature. He believed that for the maintenance of the normal temperature suprarenal activity was essential. His experiments did not show whether adrenalin itself acted in a peripheral or a central point, but he believed that such evidence as he had obtained pointed to some central action. In the afternoon, at a laboratory meeting, several demonstrations were given. Professor Waller and his colleagues demonstrated work on the electro-cardiagram and chloroform narcosis. Dr. Soresi read a paper on resuscitation and the prevention of death. The assumption was made that the ultimate cause of death is either asphyxia, anaemia, or anaesthesia of the heart, and the problem was (1) how so to stimulate the heart that it would continue beating, and (2) how to restart the action of the heart after it had come to a complete standstill. As a

matter of fact, the method was simply a slight modification of the old well-known transfusion method, in which the lining membrane of the blood vessels of the recipient and donor were brought into contact. In place of approximating the artery of the donor and the vein of the recipient, he had approximated veins. He claimed that by utilizing the external jugular of the recipient the transfusion was more effectual than by using any other blood vessel. He maintained that by direct transfusion of blood in this way he could restore to life—restart the action of the heart—an animal which had been killed by bleeding and in which there had been no beat of the heart observed for seven minutes. This result could not be obtained if in place of blood other fluids were used. Under certain conditions he found that even after nine minutes of complete cessation of cardiac action due to haemorrhage the animal could be restored by the transfusion of blood. In other experiments in which he had injured the abdominal aorta and the heart itself by stabbing them, after repairing the injuries by a special method of his own, the animal could be restored to life nine minutes after the heart action had ceased. Professor W. H. Thompson (Dublin) made a communication on the effect of argenine administration in the output of creatinine and creatine.

GENERAL PATHOLOGY AND PATHOLOGICAL ANATOMY.

PRESIDENT'S ADDRESS.

THE President (Professor Shattock) opened the proceedings of the Section on Wednesday by delivering an address, in the course of which he said: One thing we must all have long since discovered from personal experience, and that is the large proportion of work which is unattended with any positive result. The tentative questions which, when put to the test of experiment, receive negative answers would, if added up, far outnumber the contrary. How much brilliant and promising work have we not all designed, the results of which have never been recorded because they have fallen into this barren category! In a certain sense we cannot, I suppose, be dissatisfied with such negations, since something that was deemed possible has been disproved and the way cleared, in the same degree, to the access of positive truth. Human biology is unique in this, that every form of energy in the universe is concerned and takes part in the first phenomenon of life. And the explanation of what one might call this "negative science" (from the "discoveries" in which not even the greatest are exempt) is, of course, the incalculable complexity of what is investigated, as contrasted with the limitations of the researching instrument—the investigator. One ever-present temptation arising from such a state of things, and one to which we all in some degree succumb, is to substitute, of course without intention, conjecture and verbal formulae for disappointed knowledge. Let us see to it that in the meetings of this Section we overcome as far as possible our common failing.

THE RECONSTRUCTION OF BONE ONCE DISEASED.

The President then read a paper on morbid thickening of the calvaria, and the reconstruction of bone once diseased, which afforded a pathological basis for the study of the thickening observed in certain pleiocene skulls. The most recent discovery, the Piltdown skull, was that particularly referred to. This was uniformly thick, in places 11 mm. In the fractured edges the structure of the bone was remarkably well preserved; it presented a very thin outer and inner table, with intervening diploë. The osseous tissue was not diseased, yet it opened up the question whether the bone had been reconstructed after having been thickened by some previous morbid condition. Certain of these conditions could be definitely excluded, but the author was not at present prepared to go further than this. That thickenings in primitive skulls had their pathological sile was shown by a remarkably fossilized human parietal in the Museum of the College of Surgeons, acquired by the phenomenal industry of John Hunter; this was obviously a bone strikingly thickened as a result of osteitis deformans. The question of syphilis might be excluded in European men of the pleiocene period. In pre-Columbian time this disease, as was now generally held, was confined to Central and South America, and was also present in certain parts of North America. Certain archaeologists had held to the existence of a Chinese and even Egyptian influence in ancient South America, resulting from a transpacific or transatlantic migration. Both were, as Joyce observed, incredible. The Mongolian element in American aboriginals was readily explained by the original migration from North-Eastern Asia across the Behring Strait or Sea to Arctic America, whence it spread to the South. Professor Shattock agreed with Professor Elliot Smith that there was no evidence of syphilitic disease in the bones from ancient Egypt. Had the disease existed in dynastic times in Egypt it would have become European long before the Columbian expeditions took place. The President then illustrated the reconstruction of bone in the case of inherited syphilis and rachitis, pointing out that the thick finely porous external formation of tissue enclosed by any layer of infarct substance acquired in time a proper outer table and was replaced by normal diploë, the thickening persisting. That this was so appeared from the study of such syphilitic or rachitic thickenings from infancy to childhood, and thence to adult age. The thickening that occurred in the insane, chiefly in connexion with chronic mania, was of interest in association with ancient skulls. The bone, which was normal in structure, underwent hypertrophy as a result, probably, of congestion of the tissue accompanying the congestion of the brain, since the veins (with one or two exceptions) from these sources opened into the same sinuses, although, of course, the arterial supply was different. The thickening in such cases was more pronounced in the portal region, probably because the recession of the brain ensuing in the course of the disease increased the congestion, by inducing a negative pressure (as Humphry had suggested). Acromegaly, leontiasis ossea, and hypertrophic pulmonary osteoarthropathy were touched upon. As an example of a disease in which no reconstruction ever takes place he cited osteitis deformans. This disease never ceased to progress, and the bone, although it might become sclerosed, never acquired a proper lobular and diploic structure. In the case of long bones, reconstruction was rarely seen in syphilitic enlargement and sclerosis, but at times a cancellous tissue, with longitudinal mesh, might replace the sclerotic. After incomplete fractures occurring in rachitis, the medullary canal became blocked with callus, and this became reconstructed so as to fill the canal with perfectly constituted cancellous tissue, in which a longitudinal trend of the chief trabeculae might be traced. In the bridge of callus by which the fragments were united after longitudinal and wide lateral displacement, the same thing was to be found. Of the Piltdown cranium it could be definitely asserted that it was not syphilitic; it was not thickened from osteitis deformans, and the absence of frontal thickening indicated that it was not from an individual who was insane.

HYPERBLASTOSIS.

Professor Adami (Montreal), in a paper on hyperblastosis, said that it was time to reconsider a particular form of overgrowth which, too often regarded as blastomatosis, or as belonging to the tumours proper, conformed in no sense to the definition of a true tumour of the textbooks. It was not circumscribed, and could not be said to be functionally distinct and independent from its surroundings, and was either diffuse or both diffuse and multiple in its manifestations. Dr. Adami first called attention to the remarkable influence which certain of the ductless glands possessed over the relative growth of certain tissues. This growth, while generalized, was not uniform. In acromegaly, for example, it was the bones of the face and hands that manifested the greatest hyperplasia. Other similar examples were cited. Intimately associated were various forms of fatty overgrowth; those seen in adiposis dolorosa and in the large retroperitoneal and mesenteric lipomas were not true independent tumours: they merged into the surrounding fatty tissue; they respected the normal boundaries; clearly they were of the same order, and in Dercum's disease were influenced favourably by thyroid medication. But there existed quite a number of conditions possessing similar characters and not so far recognized, surely, as associated with internal secretory disturbances. Like the lipomatosis above mentioned, they showed a distinct liability to pass on to true infiltrative

malignant growth. In his experience a very large proportion of so-called gliomas were examples of gliosis. Syringomyelia also represented a similar condition. Multiple fibromas were, as shown by Veroçay, not tumours of fibrous tissue; they represented a state of diffuse, not circumscribed overgrowths of the neuroblastic cells of the sheath of Schwann. The so-called adenomyoma of the uterus was a condition of diffuse leiomyosis. More especially into this group came the large group of diffuse overgrowths of the lymphoid and bone-marrow tissues. Multiple myelomas, chloroma, lymphatic and myelogenous leukaemia were all manifestations of this state. With Aschoff and Shridde, he urged that the time had arrived to cease calling diseases after their symptoms. For leukaemia and preleukaemia they should speak of either lymphadenosis or myelosis with or without leukaemia. Intermediate forms passed by imperceptible stages to states of primary diffuse malignant overgrowth of the lymphoid and other tissues. For all these states he suggested the term "hyperblastosis."

Repair of Fractures.

Mr. Hey Groves (Bristol), in a paper on the repair of fractures and the influence upon it of various operative procedures, described his various experiments, which contradicted the view that a certain amount of movement was necessary for repair. His conclusions were:

1. Screws which merely bite into the side of the bone will rapidly loosen by a process of bone absorption if they are subjected to much tension. They are, therefore, unsuited for the operative treatment of fractures.
2. Absolute fixation of fractured ends is conducive to good repair.
3. The only way in which fractures can be firmly united by plates is by the use of pins, screws, and nuts which perforate the whole thickness of the shaft.
4. Great mobility of the ends of a fractured bone is likely to produce a false joint, especially in the case of a single bone like the femur.
5. Marked mobility of the ends of a fractured bone causes a great excess of callus.
6. Metallic magnesium is absorbed in a bone and causes great callus excess.
7. Indirect methods of fracture fixation give the most ideal results, and this is the only method possible when dealing with compound and comminuted cases.
8. The periosteum has no power of forming callus or new bone.
9. The periosteum is of great value in serving as the chief blood supply to the callus and in limiting its extent.
10. Active callus and bone formation always occur from the broken surface of the bone, and every small fragment acts as a centre of new bone growth.

The Thymus Gland.

At the meeting on Thursday afternoon Professor Aschoff (Freiburg) discussed some aspects of the thymus gland. He had found that it bore some relation to the growth of bone, for its removal in young animals led to changes similar to rickets; the rare changes were exactly like those of human rickets. In rats he had produced typical rickets. He had noted after removal of the thymus a compensatory enlargement of the thyroid. He had obtained a true regeneration after a partial thymectomy. It occurred rapidly, so that in a few days there were numerous cells and nuclei. He considered that the thymus was a true epithelial organ, and the so-called "lymph cells" were embryonic cells which form into the true cells of the gland.

Tetany.

Professor MacCallum (Columbia University) described his experimental studies in tetany, which were of great interest. He considered that tetany resulted from some change in the circulatory blood which affects the extremities, for by transfusing experiments and anastomoses of the vessels of tetanic animals into those of healthy animals he could produce similar symptoms in healthy animals, or inhibit the symptoms in limbs which were affected at will by causing normal or "tetanic" blood to circulate. Also defibrinated blood of tetany animals led to tetany on injection into healthy animals. The blood change was at present unknown, but he thought there was evidence suggestive of a disturbance in the calcium content of the blood.

Gastric Ulcers.

Dr. Charles Bolton (London) then summarized with the aid of beautiful lantern slides his well-known work on the production of gastric ulcers, and included his more recent work on the healing of ulcers, the importance of the hydrochloric acid in the gastric juice, and the effect of hyperchlorhydria due to any acid. Finally, he demonstrated the effect of diet on the healing of the gastric ulcer. Professor Aschoff drew attention to the relation of the site of the ulcer and its shape to the motility of the stomach and the effect of physiological rest, but Dr. Bolton was not in agreement with him on the point. Dr. Charles Singer (London) contributed the results of his experimental work on the same subject. He had produced numerous gastric ulcers and also small gastric papillomata in a long series of rats by keeping them under such conditions that their food was defiled by the fresh excreta of other rats. Similar results followed the feeding of rats on the minced excreta of other rats. He considered the cause of chronic gastric ulcer to be an unknown organism which was a normal denizen of the alimentary canal, but which could only exist in the stomach under pathological conditions.

The Vitality of Protoplasm.

Professor Shattock contributed an interesting piece of work by himself and Dr. Dudgeon on the vitality of chemically dried protoplasm. By depriving simple bacteria (*B. pyocyaneus*) of air and sunlight (by drying in a vacuum) he had kept them alive for two years, so that their cultural and experimental properties were retained, but exposure to air and sunlight rapidly destroyed them. *B. typhosus* and *B. coli*, however, were rapidly killed when "chemically" dried. He saw no reason why *B. pyocyaneus* should not live for ever under these circumstances.

Pathology of Fats and Lipoids.

On Friday a discussion on the pathology of fats and lipoids was opened by Professor Ivar Bang (Lund), who pointed out that the lipoid bodies, although they had with few exceptions not yet been separated in a pure state on account of their rapidly changeable labile character, and the facility with which they reacted to various stimuli, yet were known to take a constant and important part in the structure and function of the cell. They entered into the formation of the body of the cell, and, in a condensed state, form a fine membrane or covering to it—a membrane so fine that it had not yet been actually demonstrated but rather inferred from its osmotic and other properties. Further, as a necessary condition of their activity these lipoid bodies must have the power of entering into combination with albuminous bodies with extreme facility. The power of osmosis possessed by the lipoid membrane covering the cell, and the presence of these lipoid bodies within it, formed the basis of the "Meyer-Overton" theory of narcosis. This depended first on the law that a body which was soluble in two media would be taken up by these two media when brought together, in proportion to the solvent power these media had on the first body. The osmosis was a continuous solution of the body in the membrane, and a passing out of it in that state. Thus a body—say ether, for example—which could be dissolved in oil or lipoids more freely than other bodies, passed through the lipoid cell wall in much greater quantity than, for example, a salt solution. In the same way the lipoid contents of the cell would take up a proportionately greater amount of the "narcotic." According to this theory, a body which had thus a proportionately large solubility in oil became a "narcotic"; on the removal of the "narcotic" from the outside of the cell, and under the influence of the simple salt solution, the ether was gradually given up to it again. The effect of this narcosis was to stop the oxidation of the lipoids and to produce an asphyxiation. Experiment had shown that the combinations of the lipoid body with enzymes prevented excessive formation of sugar in the liver, but the effect of "narcosis" was to increase the amount of sugar. Thus it appeared that narcosis had the effect of temporarily dissolving the combination of lipoids with the other bodies. The interchange of gases in red blood corpuscles was materially diminished by narcosis. Professor Bang then dealt with the effects of the excitation of the lipoids instead of their suppression. Reference was made to polyneuritis gallinarium, brought about by feeding the fowls on dressed rice (apparently rice deprived of its lipoid bodies), and to the fact that to beri-beri, scurvy, and

Barlow's disease had been ascribed the same etiology. In his concluding remarks Professor Bang summarized the relations of lipoids to immunity, toxaemias, etc.

Dr. Fränkel (Vienna) discussed the lipoid content in pregnancy. He had found, as his tables showed, that the neutral fat content was higher in pregnant than in normal women. Similarly, in milch cows the total fats and lipoids increased rapidly after calving. He detailed his investigations on the lipoid content of the placenta in normal, pregnant, eclamptic and syphilitic women.

Dr. Cramer (Edinburgh) discussed the chemistry of the lipoids, and the various methods of identifying the fatty bodies. He had found the Marchi method to be specific as a test for unsaturated glycerides. He had investigated further normal and degenerated nerve fibres, suprarenal gland and kidney of a cat, and concluded that the suprarenal body contained no lecithin but only fats, whilst in the kidney tubules the material staining osmic acid was fat. His slide of histological specimens demonstrated the distribution of fats stained with Marchi's method in different tissues, though he would not allow that in the estimation of fats in organs the histological method could replace the chemical analysis.

Professor MacCallum read a paper by the late Dr. Angus Stewart on the relation of the lipoids to the function of the adrenals. This work was not completed at the time of Dr. Stewart's death, but he had shown that there was excess of cholesterin esters in the circulating blood in pregnancy. Extirpation of the adrenals in animals resulted in the observation that pregnant and lactating animals survived longer than normal, and this might be due to accumulation of lipoids in the blood of the pregnant animals. The discussion then centred itself around the nature of fatty change, and waxed enthusiastic, so that in the end no agreement could be reached between Professors Aschoff and Rosenfeld. The latter held that there was a real increase of fat; the former that, though there was a transportation of fat, there was no real increase owing to exchange of bodies. Dr. Leathes had found that there was no actual increase of fat in diphtherial lesions by importation to the cell. Professor Adami pointed out that there was a progressive recognition of the existence of fat phanerosis—that is, the breaking down of fat-containing bodies which gave no macrochemical reaction to the liberation of simple fats; yet there no doubt existed an extensive transportation. He held that fat phanerosis was macroscopically distinguishable from the imported fat, and thought the distinction should be maintained between the earlier described processes of fat importation and fatty degeneration as indicating uncomplicated transportation and transformation. At times, of course, the two were associated. He felt much satisfaction, and joined hands with Professor Aschoff, in noting the general acceptance of their conjoint work of 1906, which demonstrated that the doubly refractive bodies of the adrenal cortex and elsewhere were of the nature of cholesterin esters.

At the afternoon session on Friday, Dr. Roussy (Paris) read a paper on the cytological reactions provoked in tissues as a result of the deposits of cholesterin. He demonstrated that around collections of cholesterin there was a cell reaction with the formation of giant cells and plasmodium cells. His beautiful coloured lantern slides showed what resembled a low form of inflammation. In a second paper Dr. Roussy dealt with different fatty substances formed around a cerebral cyst. He noted two types of fat granules which stained differently with various dyes. Professor Shattock, continuing the discussion on fat pathology, brought forward a new fatty tumour, which he called lipoma glandulare. It had come from the inner side of the elbow, and histologically showed cells with central nuclei, crowded with small fat globules. This resembled the "hibernating glands" of the hedgehog, and he had noted an analogue of these hibernating glands on the neck of the human embryo. He also pointed out that in cretins the masses in the root of the neck consisted of glandular fat. Professor Warthin had found similar appearances.

Pituitary Body.

Professor Pietro Guizzetti (Parma) described the development of masses of pavement epithelium in the anterior lobe of the pituitary body. These had been worked out in a baby 2 weeks old, and, as one speaker remarked, they had an important bearing on the formation of certain forms of malignant tumours.

Haemolymph Nodes in Protozoal Infection.

Professor Warthin (Ann Arbor, U.S.A.) discussed the reaction of haemolymph nodes to chronic protozoal infection. He had found, as he showed in his lantern demonstration, that in Texas fever amongst Texas steers (especially the "immunes") an extraordinary hyperplasia of haemolymph nodes which sometimes reached the size of a Tangerine orange. In chronic protozoal infection there occurred a great lymphoid activity, with production of lymphocytes.

The Tuberculous Etiology of Thyreosis.

Dr. Joseph Hollos (Hungary), in a paper on this subject, maintained that the great majority of cases of exophthalmic goitre were of tuberculous origin, the seat of the infection lying mostly in the apex of the lung or in the bronchial glands in a latent form, often not discernible by the ordinary methods of examination. He had examined 33 cases in all, including 21 with pronounced hereditary history, and slight tuberculosis of the lungs in 28. Treatment with Spengler's I K in 26 cases resulted in recovery in 10 cases and improvement in 15. He urged that all cases should be treated with tuberculin.

Grafting of Normal Tissues.

A discussion on grafting of normal tissues and its dependence on zoological or individual affinity was opened by Dr. Max Borst (Munich) on Saturday. He pointed out that the transplantation of normal tissues or organs on to another portion of a similar or dissimilar body which had of late aroused the interest of theoretical and practical medicine had an important bearing on the functional significance of certain organs, such as the thyroid gland and pancreas, and on the question of new growths. Further, the surgeon had produced remarkable results, by transplantation, in making good defects, and transplanting organs—such as the kidneys. He then discussed the conditions favourable and unfavourable to the success of the process: The more highly developed the animals the less the chances of survival of the grafts; the size of the grafts; their vitality, new *milieu*; the temperature, age, etc. But, while all these conditions might be the same, the results would differ according as the grafts were *auto-* or *iso-*, homoio- or hetero-plastic—that is, according as the grafts were taken from the same bodies or similar ones or from quite different bodies. While describing very fully the various experiments in heteroplastic operations, he agreed that the results on the whole had been—failure. The results of iso- or homoplastic transplantations, while on the whole more favourable and enduring than those of the heteroplastic, were yet such as would not stand closely critical inspection. When black negro skin was transplanted on white the black took on gradually the colour characteristics of the white and vice versa, and again the excellent results of transplanting cornea, where it gradually cleared up and became part of the host, might be taken as betokening processes of substitution of the invading tissue of the host for that of the graft. The results of autoplastic transplantation, however, were by far the most favourable. Numerous experiments with the various tissues showed that they were preserved intact for a long period and that they kept on growing. In bone the periosteum had been shown to be the important factor in reproduction of the tissue. In numerous experiments whole organs had been transplanted, the circulation being effected by the suture of the blood vessels after the method of Carrel, with more or less success in preserving growth and function in the transplanted organ. He next referred to the "explantation" of tissues—that is, preserving a living and growing tissue *in vitro* in a suitable plasma, so that life and growth continued. The attempt to produce by this means a body immune to cancer had not been successful. He ascribed the failure of the iso- and heteroplastic transplantation to the extreme specialization of the cell in the higher animals. In the plant the cell was provided with formative plasma, so that a small part might reproduce the whole organism. With the advance in development and specialization this

plasma was rather used up in the general body and concentrated in the generative organs; the cells became more and more interdependent. Each species, and indeed each individual, must be regarded as a specific bio-chemic system, so that with each advance in phylogenesis there emerged a specifically constructed and a specifically reacting system. On this basis he constructed a theory of "bio-chemic difference" to account for the opposing forces to iso-transplantation and hetero-transplantation. He then dealt with the difficulties in maintaining the nutrition of the transplantation; not only was simple nourishment required, but excitation of function, for without function the cell atrophied. The various toxic reactions of graft on host, and vice versa, were indicated. The question of facilitating and improving the results of isoplastic and heteroplastic grafting was then discussed. He concluded that the practical result of these investigations and facts was that no expectation of an enduring result should be entertained in cases of isoplastic or heteroplastic grafts. In many cases the transplanted tissue served merely as a conductor or model for the regenerated tissue of the host. Where formative layers were contained in the transplanted tissue, as in periosteum, bone, etc., their growth assisted the regeneration and substitution process in the host. The maintenance of the graft itself depended, in this isoplastic method, on the existence of the least possible bio-chemical differences between recipient and giver—not only similarity of species and race, youth in both, but also near blood relationship. These considerations naturally led to the conclusion that the autoplastic transplantation must give results far better than the other methods. In addition to the postulate that success depended on the rapidity of the establishment of nutrition and function, he had established by his researches a third in the necessity for a "bio-chemical characteristic." "All the more recent investigations in the direction of the isoplastic have," he said, "strengthened the doubt whether any highly profitable results—to higher animals and especially to man—will ensue. Bio-chemic differences exist not only in members of the different species, but also in those of the same species, and even of the same race. These differences diminish with the nearness of the degree of relationship. Therefore, this isoplastic operation has the best prospect of success with those most nearly connected. The failure of the 'isoplastic,' as occurs with constant uniformity, in the transplanting of whole organs, with the assistance of the 'vessel-suture,' shows us that we have a right to speak of an 'individual' as an 'indivisible' one. The proclamation of individuality in a bio-chemical sense is the main result of these investigations." Professor Borst illustrated his paper by some marvellous lantern slides, showing grafting of butterflies one on the other, earthworms with interchanged heads, tadpoles grafted at different points, and others with excess of limbs, as well as skin grafts, bone, etc., in mammalia. The President (Professor Shattock) pointed out the importance of the summary presented to the meeting by Professor Borst; the chief impetus to the employment of grafting was given by John Hunter, who had collected numerous examples in his museum. Mr. Shattock exhibited the original cockspur with a human tooth grafted thereon. In the case of the testicle he said that the difficulty was to prevent growth after attempted removal, and often numerous growths appeared throughout the peritoneum. He exhibited a specimen illustrating this. The tooth in Hunter's case was evidently alive. But heteroplastic grafting was not satisfying, and the graft did not live as long as the rest. His experiments with bones of rabbit's fetus, which were put under the skin of the doe repeatedly, were very interesting, and though the bones persisted they took no part in the life of the doe. If heteroplastic grafting proved permanently successful it would be difficult to establish difference between species, and possibly the sterility between different species was due to the formation of antibodies after the entrance of the spermatogen into the ovum. He accentuated the importance of recognizing the existence of a definite co-ordination of growth between the tissues of an animal—a harmonious interdependence. Dr. Murphy (New York) had experimented with rat tumour by grafting into a chick embryo, and had obtained some results. Dr. Adami agreed that autoplastic transplantation was possible, but isoplastic tended to die out. Dr. Bashford was also in general agreement, and mentioned the difficulties of cancer transplantation in mice, for the tumour would not form in a normal mouse, and a tumour from one mouse would only form in that animal. He was sceptical as to the possibility of transplanting entire organs. Some experiments on tissue explantation were then detailed, but were not convincing. Dr. Lambert (New York) had kept rat tissue alive for thirty-five days in plasma mixed with Ringer's fluid.

BACTERIOLOGY AND IMMUNITY.

IN a few words the President (Professor Sims Woodhead) spoke of the happy auspices under which the profession was meeting in London, and stated that the interchange of views could only lead to a better understanding among the nations of the world.

ANAPHYLAXIS.

This subject was the theme of discussion at a meeting of the same Section at the Budapest Congress in 1909, and several of those who then took part were again present, and again expressed their diverging views. In the interval the subject has been subjected to much experimental investigation, and a vast literature has grown out of small beginnings. But in spite of all that has been said and written, it is very apparent that we are still standing at the threshold of the edifice which contains protective means against disease.

Professor Friedberger of Berlin, who introduced the subject on this occasion, expressed the view that anaphylactic poisoning was only to be differentiated from other forms of intoxication by the fact that the toxic substance was in its original condition more or less harmless, and that it only became toxic when the reactive processes of the organism led to a well-defined combination between disintegration products and the whole substance when introduced for a second time. He gave an excellent summary of the work done more or less recently on the specificity of various forms of protein anaphylaxis, and then proceeded to examine in some detail the nature of the anaphylactic shock. He emphasized the necessity of regarding the symptoms (especially the fever reaction, the dilatation of the lungs, and the death with typical convulsions, etc.) as the criterion of anaphylaxis. The disappearance of complement occupied his attention in the next place, and he brought forward evidence of the necessity of complement for the anaphylactic reaction, which must certainly be regarded as strongly in favour of his views. Having developed his arguments up to this point, it was but a step to piece the three components of his anaphylatoxin together—namely, the original antigen or protein poison, the split product or antibody, and complement. Having arrived at this stage, he sought to anticipate objections which might be raised, and dealt with each singly, offering explanations for many phenomena which appeared to stand in the way of the acceptance of his views. He was satisfied to argue that the test tube anaphylatoxin and the poisoning agent which led to the shock must be identical, not only because the symptom-complex which arose in each case was indistinguishable, but also because the reaction could be worked out quantitatively on this basis. Recent experiments had proved that the apparent discrepancy in regard to time was not real. He claimed further that endotoxins were not primarily formed substance, but arose as reaction products just like anaphylatoxin. This view he supported by means of simple arguments. In the first place, the lethal doses varied considerably, which would not be the case if they were preformed substances; then dissolved bacteria only acted toxically on isolated organs if serum were present; anaphylatoxin was formed before bacteriolysis had taken place; and lastly, anaphylatoxin was considerably more potent than bacteriolysin. He utilized an attack on the absorption theory to pass on to the mechanism of anti-anaphylaxis. In conclusion he said that he regarded anaphylaxis as an acute and extreme instance of infection, and infection in the sense of infective disease as a mild, protracted form of anaphylaxis. His speech was greeted with applause at its termination.

Both Professor Richet and Professor Besredka were absent, and their reports were read in abstract by Professor McWeeney. The former dealt with alimentary

anaphylaxis. It was, he said, difficult to explain why some toxalbumins and albumins under certain conditions and at certain times escaped the protective action of the gastric juices and were absorbed in minimal quantities to give rise to mild anaphylaxis (rashes, fever, etc.). At the same time, there was a definite tendency for the production of an immunity, so that those foodstuffs which were habitually ingested might escape in small quantitities without any danger of anaphylactic symptoms developing. In the second part of his paper he dealt with the clinical manifestations of alimentary anaphylaxis, and gave some hints as to the means available for the prevention of marked symptoms.

Professor Besredka's paper contained details of active and passive anti-anaphylactic experiments, and descriptions of the methods which have been found of use in preventing shock in experimental animals, including the utilization of repeated small doses, the employment of anaesthesia and of alcohol. He discussed the modes of procedure for anti-anaphylactic "vaccination" in human beings who develop alarming symptoms of shock after a second dose of serum.

Professor Weil (Cornell University) was the next speaker. He took up the cudgels in favour of the old humoral theory, and attempted to overthrow the cellular theories, which have to a great extent been accepted both in this country and in Germany. He sought to strengthen his position by quoting a number of highly ingenious experiments which he claimed supported his views, but which might have been utilized in support of arguments from the other side. One example may be quoted. An organ (uterus) was isolated, washed out with Ringer's solution, and the muscular contractions graphically recorded. When normal serum was brought into contact with the muscle the contractions did not differ from what occurred when no serum was used, but when the antigen was employed a marked tetanic contraction resulted. From this he argued that serum did not play any part in the phenomenon, but he did not take into consideration that it is impossible to free the tissues from serum, and it is still possible that the retained serum may be necessary for the tetanic result.

Following him came Dr. H. H. Dale of London, who described in simple language some refinements in experiment which delighted the audience. He was able to show that a marked degree of specificity could be demonstrated by means of isolated organs, and that the delicacy of this reaction was greater than any other form of biological test. He has therefore applied it for forensic purposes. Professor Bordet, whose elegance of expression and also conciseness of scientific terminology always lends an additional charm to his speeches, started by accepting Friedberger's anaphylatoxin, and then developed his opinions in regard to the cleavage of the protein molecule in the preparation of this toxic substance. He exemplified what he had to say by citing amylase.

Much amusement was caused by the violent method of attack which Dr. Kraus of Vienna assumed in overthrowing everybody and everything. His contention was that he and Biedel had shown the only reliable method of getting at the truth of anaphylaxis. Biology and chemistry had failed, but physiology succeeded. He demanded that before any phenomenon was accepted as anaphylaxis it must be obtainable in guinea-pigs and dogs, and that the classical physiological signs must be present. Dr. Thiele also spoke. Dr. de Waele, who also read a paper in the afternoon session on the same subject, ascribed everything to an increase in the coagulability of the blood.

Darts of a harmless nature flew fast and furiously when Professor Friedberger rose to reply. He disposed of Drs. Kraus and de Waele in a few words, by means of flat contradictions, but in other cases he argued in some detail. The discussion ended happily for all concerned, for, in spite of extraordinary differences of opinion, we can rest satisfied that material progress has been made in this knotty problem, and the workers in various countries remain good friends holding different opinions.

THE NATURE OF VIRULENCE.

Unfortunately Professor Dr. von Grüber, who was to have opened a discussion on the nature of virulence, on Saturday, was not present and the discussion fell through. Professor Sims Woodhead said that the session would be occupied by the reading of independent papers; and he asked Geheimrat Professor Dr. Loeffler to replace him in the chair.

THERAPEUTIC USE OF SENSITIZED BACTERIA.

Dr. W. Broughton Alcock, who is a worker in Metchnikoff's laboratories in the Pasteur Institute, filled the breach admirably, and the audience were soon deeply interested in the subject of vaccination with sensitized living bacteria. It must be pointed out that Dr. Alcock was the first to use living bacteria as vaccines in the treatment of human disease, and that the members of the Bacteriological Section of the Congress admitted his priority to a full extent. Dr. Alcock showed that Besredka had worked out the principle on which his work was based; micro-organisms, he said, lost in virulence, became more readily phagocytosed and less toxic after contact with the specific immune serum, containing all those numerous antibodies such as agglutinins, anti-aggressin and antitoxins, in the serum of persons or animals infected with the particular bacterium. This loss of toxicity and of virulence did not impair their vaccinating power. He adduced experimental evidence that cocci could be injected into the infected animal, first dead and then after sensitization in a living condition, even into the veins, without harm accruing, the antagonistic properties being called into play and thus neutralizing the lethal effect of the living microbes. He sketched the histological appearances of a local staphylococcic and streptococcic infection, showing what the organism did in its defence against invasion, and then developed his arguments in favour of his application of these facts to vaccine-therapy. Heated bacteria had been utilized on the Continent by Pfeiffer and Kolle and by Chantemesse, and in this country by Almroth Wright, in the treatment of disease. He insisted on the observation that in mixed coccal infections the phagocytes tended to take up and destroy the non-virulent strain while the virulent cocci were left untouched. Having entered into further details in regard to the basal work on which his treatment depended, the speaker recorded the first experiments with human beings in which killed sensitized cocci were injected in large doses with but slight reactions. The first case thus treated dated from August, 1912, and since that date over 2,000 injections had been given. No injurious effects had been met with. He then gave an account of his method of sensitizing cocci. A peptone-agar culture or serum-agar culture was washed in 0.8 per cent. saline solution, and the cocci were then brought into contact with the specific serum for from one hour to twelve hours, according to the strain. The suspensions were then centrifuged and washed and a new suspension made in which 2,000 million bacteria were contained in 1 c.cm. of saline. Children received from $\frac{1}{4}$ to $\frac{1}{2}$ c.cm. and adults from $\frac{1}{2}$ to 3 c.cm. At first he had given sensitized heated cocci, followed later by sensitized living cocci, but more recently he had given small doses (300,000) of living germs to begin with. The dose was repeated after an interval of from seven to ten days. He did not use the opsonic index as a guide, but trusted to the appearance of a slight or local general reaction. He discussed the selection of strains of cocci for the preparation of vaccines, the general principle being that when possible autogenous micro-organisms were employed. In regard to the results obtained, he stated that 7 out of 40 patients suffering from gonorrhoeal urethritis or vaginitis were free from discharge after two to three weeks, while the rest were but little improved. Of his 30 cases of orchitis-epididymitis, permanent cure resulted in those patients who received six doses. He had given the vaccine in 21 cases of arthritis and periarthritis with excellent immediate results in the acute cases. In one case, a bed-ridden patient of the chronic type, doses up to 9,000 million were given, with the result that free movement in all but the shoulder-joint was obtained in six weeks and a half. He did not give the number of his acne patients who had been cured by the vaccine treatment, but he stated that in some the cure was not definite; 7 cases of seborrhoeal eczema were either cured or markedly improved by the injections; complete cure of sycosis in 4 cases out of 7 was obtained; good results were obtained in carbuncle, impetigo, and several forms of streptococcal infections. He was also in a position to state that Major Harrison and Dr. Eyre had employed the method in a few

cases with highly satisfactory results. He claimed that no danger existed in the application of the living vaccines. Geheimrat Loeffler questioned the advisability of injecting subcutaneously living cultures, if it could be shown that intravenous injections were fraught with danger; but Dr. Alcock responded that it was feasible to exclude the possibility of the needle entering a vein, and the practical application of the injections had shown that no danger arose from it. Dr. Thiele made a few remarks on the danger of injecting sensitized red blood corpuscles into rabbits intravenously, but the objection which he raised to the injection of sensitized bacteria was satisfactorily disposed of.

ETIOLOGY OF OZAENA.

Dr. Hofer read a very useful paper on the causation of atrophic rhinitis (ozaena). Having described the various bacteria which had been associated with this condition, he turned his attention to the *Coccobacillus mucosus* of Beeritz. His experiments with this bacillus showed that not only local applications to the nasal mucous membrane of the rabbit but also intravenous injections resulted in a typical rhinitis with the characteristic odour. The cultures also had the same smell. The serum of patients suffering from the condition agglutinated cultures of this bacillus, and he claimed that there was every reason to accept the same as the causal organism of atrophic rhinitis. Professor Kraus asked whether the effect of intravenous injections giving rise to local lesions might not be interpreted as a sign of excretion of bacteria rather than of local specificity. Geheimrat Loeffler called attention to Abel's work on this subject, but appeared to be satisfied with Dr. Hofer's reply, which was to the effect that Beeritz's bacillus possessed all the characteristics required of a causal organism, which Abel's did not.

Many members were called upon to read their communications, but did not answer to their names. Part of a paper by Dr. N. F. Surveyor on a new method of vaccine treatment was read; and the last communication was that of Dr. F. B. Turck, who spoke of the effect of feeding animals with cultures of *Bacillus coli* in increasing the virulence of the bacilli and in producing certain lesions in the kidney, liver, and other organs. No discussion followed.

DIPHTHERIA CARRIERS.

On Friday morning the Section was occupied, along with the Subsection of Chemical Pathology, in the discussion of cancer (p. 373). At the afternoon session of the Section, Dr. W. L. Moss, of the Johns Hopkins University, Baltimore, read a highly interesting paper on the work done by himself, Dr. Guthrie, and Dr. Gilien on diphtheria carriers. Having studied the conditions of 3,300 persons who were not suffering from clinical diphtheria and having examined upwards of 5,000 cultures, they came to the conclusion that in Baltimore a very large number of persons, representing about 3.55 per cent. of those examined, were bacillus carriers. It was true that only a comparatively small proportion of the cultures (between 18.18 and 11.11 per cent.) proved to be virulent, but the persistence of the bacilli in throats was marked. A curious fact which was elicited was that the number of carriers remained greatly in excess of the cases of clinical diphtheria. None of the carriers developed clinical diphtheria during the period of observation, and the observers could not satisfy themselves that in many single instances did these carriers give rise to the disease among healthy associates. Dr. Embleton suggested that the bacilli observed might not have been the Hoffmann bacillus, which at times became converted into a true Klebs-Loeffler bacillus. This possibility was denied by Dr. Duval; and Dr. Browning asked whether the presence of the bacilli should not be regarded as a danger to the community, to which Dr. Moss replied that they had failed to trace a single infection from the carriers.

THERAPEUTICS.

DISCUSSION ON THE DEFENCES OF THE BLOOD.

ON Thursday morning Sir Lauder Brunton declared the Section of Therapeutics, including Pharmacology, Physiotherapy and Balneology, duly open, and invited Professor Heger of Brussels to read his paper upon defensive measures of the organism against foreign substances in the blood. A few minutes later every seat was occupied. The President in his opening remarks, after explaining the necessity of strictly observing the time limit as regards communications and speeches, proposed in the same breath, amid applause, on this particular day to break the rule and withdraw all time limits, as a mark of their appreciation of the distinguished character of those taking part in the debate and of the extreme interest in the subject.

Professor Heger, speaking in French, devoted himself to a consideration of the various barriers and lines of the defence erected by the body against invasion by a foreign substance. The "humoral defence" consisted of chemical changes in the circulating plasms capable of destroying or modifying the circulating poisons. The defence of phagocytes and the parietal defence were further barriers. Even if these were evaded the specific action of the liver and other cells in the destruction of poisons and the powers of rapid elimination were sufficient to overcome and neutralize the offending substance in most cases. Professor Abderhalden, speaking in German, concerned himself not so much with the site of these reactions as with their nature. The presence in the blood of substances from which all specific character had not been withdrawn by the processes of digestion and absorption—substances, for example, given up to the circulating plasma by necrotic body cells, by cancer cells, or by the bodies of bacteria—resulted in the production of ferments capable of modifying or destroying the offending matter. The discussion was continued by Dr. Zunz (Brussels), who in turn was followed by Professor Meltzer (New York), who recounted experiments which seemed to show that in frogs morphine produced convulsions more rapidly and in smaller doses after removal of the heart than in frogs with the circulation intact. This he interpreted to mean that some substance was normally present in the blood which had the power of destroying or lessening the action of this drug. This brought to his feet his friend, Professor Abel (Johns Hopkins University), who admitted the truth of the observation, but would in nowise accept the explanation. The increased nervous excitability was due, in his view, to a direct connexion by means of the blood stream between the dorsal lymph sacs and the brain. As it appeared that no agreement was likely to be arrived at, the main discussion was continued by Dr. Citron (Berlin), Professor Gottlieb (Heidelberg), Dr. Breitmann (St. Petersburg), and Professor Dixon (London and Cambridge). Professor Heger replied, incidentally allowing Professors Abel and Meltzer to define again the points on which they disagreed, and Professor Abderhalden summed up.

PAPERS.

The later part of the session was occupied by a paper contributed by Professor Straub upon experimental lead poisoning, and communications were received also from Drs. Lippmann and Pincussohn (Berlin) on researches, chemical and therapeutical, upon metal compounds; Dr. Schreiber (Magdeburg) on the chemistry and therapy of mercury compounds; Dr. Roch (Geneva) on poisoning by phosphorus; Dr. Laviallo (Paris) on the properties of highly sweetened milk; Dr. Douglas Cow on the action of the quebracho alkaloids; His Excellency Dr. Camillo Calleja (Madrid) on a code of contraindications; Dr. Félix de Backer (Paris) on therapeutic ferments in acute and chronic diseases; Dr. J. C. McWalter (Dublin) on animal extracts and the hormone theory; and Drs. Bertrand and Cohendy (Paris) on the therapeutic employment of sensibilized viruses.

REMEDIES FOR PAIN AND SLEEPLESSNESS.

On Friday a discussion on the action and use of remedies for pain and sleeplessness was opened by a paper by Professor A. R. Cushny of London, who defined shortly the properties of an ideal hypnotic. It must be tasteless and odourless, it must be reliable and constant in its action, and it must act on the cerebral centres only, and have no action on other parts. In turn he reviewed the various hypnotics in the light of these requirements. He would dismiss sulphonal from use on the ground of its capricious and inconstant action. He desired to remove a stigma under which, quite undeservedly, chloral had rested for many years. He knew of no scientific evidence that

chloral was depressing to heart and circulation. Veronal was a good hypnotic, and recent newspaper reports should not obscure the fact that the medicinal dose was widely separated from the poisonous dose. In remedies for the relief of pain less progress had been made, and the substitution of morphine for opium represented almost the only advance of the last half-century. The salicylates, phenacetin, and other members of the same group were valuable in the relief of pain of a certain nature, such as rheumatism and the various forms of neuralgia. The remainder of the paper dealt with the mode of action of these various drugs. Dr. Robert Jones (Claybury), who followed, described his own practice in the use of hypnotics among the insane, and emphasized the importance of realizing that there are many varieties of pain, both mental and bodily. Dr. Fortescue-Brickdale (Bristol) dealt with the relationship between chemical structure and pharmacological action. Professor Wild (Manchester) urged that in lingering cases of inoperable cancer sufficient doses should be given to secure freedom from pain, even though these doses had to be very large. Professor Bradbury (Cambridge), Dr. Baruch (New York), Dr. Roch (Geneva), Professor Dixon (Cambridge), and Dr. Garson also joined in the discussion, while the President, in response to the evident wish of the meeting, shortly recalled his experiences with bromides on their first introduction. On the whole the level of the discussion fell far below that of the previous day. Some speakers extended the scope of the subject to include such measures as hydrotherapy, while others dealt with the treatment of such causes of pain and sleeplessness as adenoids, anaemia, constipation, or even an aching tooth. The only points which received repeated emphasis in the discussion were the utility of alcohol in the treatment of both pain and sleeplessness and the unsatisfactory results obtained by the use of sulphonal.

The remaining papers upon the programme, ten in number, included a paper by Professor Brodie of Toronto upon the mechanism of renal secretion, a paper by MM. Rénon, Degrais, and Dreyfus (Paris) upon the treatment of myeloid leukaemia by radium, and a paper upon the treatment of diabetes and glycosuria by Professor Nestor Tirard of London.

Sectional Dinner.

In the evening the sectional dinner for members and ladies was held at the Mitre Hotel, Hampton Court, while by special permission of His Majesty's Office of Works the palace and grounds of Hampton Court were open for inspection earlier in the afternoon.

Demonstrations.

On Saturday morning the Section of Therapeutics was divided into two parts. The Subsection of Pharmacology held a laboratory meeting in the Pharmacological Institute of University College, while the Subsection of Balneology and Physiotherapy met in the Astrophysics Laboratory of the Imperial College.

Pharmacology.

In this Section the demonstration which excited the liveliest interest was that by Professor John T. Abel of Baltimore, who showed a new method for the removal of diffusible substances from the circulating blood of living animals by means of an artificial glomerulus. In an anaesthetized animal blood was conducted by a cannula tied into the carotid over a series of celloidin tubes before being returned into the jugular vein. The celloidin tubes were immersed in a sealed vessel containing normal saline. Diffusible substances circulating in the blood passed across the celloidin with great ease and rapidity into the surrounding fluid, where they could be subjected to fractional analysis. Salicylic acid injected into a vein was excreted in some cases more rapidly by this artificial kidney than by the normal excretory channels. The demonstration was warmly applauded at the close. Other demonstrations were provided by Professors Dixon (Cambridge) and Halliburton (London), who showed the influence of drugs upon the cerebro-spinal fluid; by Professor Cushny (London) illustrating the action of drugs upon respiration; and by Dr. H. H. Dale (London), who showed the action of drugs upon the surviving uterus.

Balneotherapy.

In the Subsection of Balneology and Physiotherapy the chair was occupied by Professor Nestor Tirard (London). Professor Combe and Dr. Ceresole discussed the dietetic treatment of entero-colitis. Dr. Alexandre Cavvadias read a paper upon the treatment of stasis in the colon. Dr. Neville Wood urged the advantages of British health resorts for foreign invalids, deploring the fact that while the stream of patients seeking relief at spas and health resorts was active in the direction from these islands to the Continent, there was little indication of a current in the opposite direction. Dr. Woods detailed several points in which the health resorts of this country offered peculiar and striking advantages to be met with in the climate of no other country. Dr. Desfosses dealt with the treatment of enteroptosis by massage and gymnastics. Dr. Dreuw described a new system of massage by hydro-vibration. Professor Baruch (New York) urged the need of instruction in the remedial uses of water, and urged that systematic courses in the subject should be held at all medical schools.

MEDICINE.

Haemolysis.

The proceedings of the Section of Medicine were opened on Thursday by the President, Professor Sir William Osler, Bart., with a few introductory observations. Over two hundred members of the Section were present, and the first paper they heard was Professor Banti's (Florence), who gave an exhaustive account of the clinical aspects of haemolysis, more particularly as they affected the spleen. In many patients with splenomegaly, as he pointed out, anaemia was present, and a great deal of work had been done that tended to prove that the anaemia in such patients was due to excessive haemolysis that took place in the pathologically enlarged spleen. He made reference to the association of splenomegaly with cirrhosis, a combination which was familiar, by name if not *de visu*, to most medical men as Banti's disease. He summarized the work that had been done so extensively on the Continent of Europe with haemolytic serums, and noted that the spleens of animals treated with such serums showed changes very similar to those met with in the splenomegaly with anaemia of human beings. Among the other speakers who illuminated this somewhat academic, or at any rate highly technical, subject was Professor Chauffard of Paris, who ascribed to the spleen an important influence in all the human diseases that were characterized by the occurrence of haemolysis. He did good service by bringing out the fact that the enlargement of the spleen, habitual in these cases, might be either the cause of the haemolysis or its effect. If it were the cause of the haemolysis, clearly the condition would be improved and the anaemia cured by the operation of removing the spleen. If, on the other hand, it were an effect of the haemolysis, splenectomy would only accelerate the patient's passage to the grave. How can one distinguish between the two cases, he asked, and how can one know when splenectomy is advisable? These questions he could not answer with any confidence himself, and he called for further investigation and information on the results of removal of the spleen. Animal experiments had given contradictory results in the hands of different observers.

Duodenal and Pyloric Ulcers.

An interesting paper on this subject was read by Professor C. A. Ewald of Berlin. He pronounced himself horrified by the statistics of British and American surgeons, who claim to have proved that duodenal ulcer is a commoner, perhaps a far commoner, complaint than ulcer of the stomach. How could such statements be justified? he asked. Reference to *post-mortem* room statistics afforded no support to such surgical statements; in his own clinic he had treated 532 cases of gastric ulcer and 82 of duodenal ulcer during the three years 1910–12, and he quoted Continental (European) statistics to prove that, as a matter of fact, gastric ulcer was quite six times as common as ulcer of the duodenum. Yet he was at pains to acquit the surgeons of intentional error in their statistics, and explained that their mistake arose from the fact that they only met with the severe and the chronic cases of such ulceration on the one hand, and on the other from their habit of including among duodenal

ulcers those ulcers that extend from the pylorus. Professor Ewald doubted whether regional or occupational factors could afford an explanation of the surgical statistics and the inferences surgeons drew from them. He further felt himself bound to dissent very strongly from the dictum of Sir Berkeley Moynihan, who said that a careful history sufficed to make the diagnosis of duodenal ulcer, and that it was not necessary to examine the patient before coming to a positive conclusion. He went on to say that patients with cholecystitis, appendicitis, tabes with gastric crises, or even severe neurasthenia, might find themselves exposed to operations for the cure of non-existent duodenal ulcers, should such diagnostic criteria as Moynihan's be accepted as adequate. He himself laid particular stress on three or four points in diagnosing duodenal ulcer: (1) The long duration of the case, and the recurrence of pain two or more hours after food had been taken. (2) The presence of manifest or occult blood in the stools; repeated examinations might be called for before this blood could be demonstrated. (3) Hyperchlorhydria, which was almost constantly found, and might be seen even when the patient was fasting. (4) Skiagraphic examination of the stomach after a bismuth meal; the duodenum is then seen to fill up with unusual rapidity, the stomach is often not yet empty after six hours, the gastric peristalsis is abnormally forcible, the stomach itself was frequently displaced downwards and to the right.

Dr. Max Einhorn and Dr. N. E. Brill, of New York, both disavowed the surgical statistics to which Professor Ewald had taken such exception, so far as America was concerned; while Professor R. Saundby (Birmingham), though ready to advocate operative treatment in a large number of the cases of duodenal ulcer, expressed himself as not prepared to go so far in this direction as certain British surgeons of eminence.

Typhus Fever or a New Disease?

In the afternoon Professor N. E. Brill of New York read an interesting paper on an acute infectious disease similar to and perhaps a modified form of typhus fever. At the outset he was careful to explain to his audience that typhus fever was not the same as typhoid fever, better called enteric fever. His observations were made on 321 cases of this apparently new complaint, and after giving an admirable summary of its chief characteristics and drawing attention to the extraordinarily severe headache that is constantly present while the fever lasts, he gave a detailed account of the points in which it differed from the classical typhus fever so well described by Murchison and others fifty years ago or thereabouts. He laid stress on the complete absence of contagiousness characterizing the new complaint; typhus fever, on the other hand, had always been notoriously catching. The new complaint, again, was practically never fatal—out of some 400 cases he had seen or collected only one had died. Typhus fever, on the other hand, was fatal to from 18 to 25 per cent. of the patients as a rule; in even the mildest of the typhus epidemics hitherto described the mortality had been as high as from 5 to 8 per cent.

Owing to the lateness of the hour no general discussion of the paper could take place. But the upshot of the matter was that Professor Brill's disease may in all probability be set down as an unusually mild and benign form of typhus fever. The treatment of such fevers is better and more rational nowadays than it used to be in older times, particularly in such countries as have well-organized fever hospitals and sanitary authorities. The importance of fresh air in preventing contagion is fully understood at the present time; and, finally, there is no doubt that the specific infectious fevers (of which typhus is one) may readily change their type, and become attenuated in the course of time for reasons that we do not fully understand.

Status Lymphaticus.

The afternoon session on Friday was occupied by the reading of three good papers. The last of these, by Dr. Haven Emerson (New York), dealt with the occurrence of the status lymphaticus (or lymphatism) in adult males. It may be noted that the general public comes to hear of this rather uncommon condition mainly by means of the coroner's court; for the children or adolescents who suffer from lymphatism are those who are apt to die suddenly and unexpectedly while under the influence of an anaesthetic. Dr. Emerson brought forward a number of considerations to show that the milder degrees of status lymphaticus were surprisingly frequent in the men treated for chronic alcoholism and insanity. His facts and figures were drawn from 1,000 of the male patients admitted to the alcoholic wards of the Bellevue Hospital in New York. No fewer than 220 of these patients showed most if not all of the physical attributes characteristic of the status lymphaticus. The chief of these attributes were as follows: Scantiness or absence of the hair on the lip, chin, chest, and axilla; a feminine type of distribution of the pubic hair; a tendency to narrowness and length in the thorax; a notable roundness and arching of the thighs and roundness of the upper arms; smallness of the penis and testes. Often the skin was peculiarly soft and velvety, and peculiarly free from hairs. Dr. Emerson failed to find the enlargement of the spleen that is so commonly said to occur in lymphatism. Examining the hospital *post-mortem* records he found 288 cases of status lymphaticus in 3,600 obductions, and 242 of these patients had succumbed to infecticus diseases, such as tuberculosis, pneumonia, meningitis, and enteric fever. He draws the conclusion that persons with this mild or incomplete type of lymphatism are bad subjects for surgical operations, are prone to die (when normal people would recover) if they contract an infectious disease, and show a tendency to alcoholism, the drug habit, and insanity. He did not go so far as to say that they were social undesirables, but was of the opinion that they should be protected both against infectious disorders and against themselves.

SURGERY.

Cancer of the Large Intestine.

At the second meeting of the Section, on Thursday, a discussion on the operative treatment of malignant disease of the large intestine, exclusive of the rectum, was opened by Professor Rafaele Bastianelli of Rome and Professor Körte of Berlin. Professor Körte's paper was an elaborate study of the subject replete with historical references and statistics drawn from all sources. Collapse and peritonitis, which, he said, were the special dangers of resection of the large intestine for malignant tumours, were due chiefly to the anatomical relationships of the resected portion of bowel and to the difficulty of preventing soiling of the peritoneum. In acute intestinal obstruction a simple procedure for emptying the bowel—namely, colostomy—was alone possible, performed then with the intention of going on to a secondary radical operation in two or three stages. In chronic sloughing of the intestinal flow the two or three stage operation by suture (colostomy, resection of the tumour, closure of the colostomy) was the most certain operation, though a slow method. Where it was possible thoroughly to empty the bowel, ensure perfect haematosis and absence of tension of the sutured bowel ends, the one-stage resection and suture was best. The various anatomical relations of different portions of the great intestine demanded various operative procedures. The expectation of long-standing recovery was relatively favourable in carcinoma of the great intestine. As regards palliative operations, entero-anastomosis, in the absence of obstruction, was the best. Colostomy, which might mean caecostomy, was the method of choice where obstruction existed. Colectomy or entero-anastomosis was to be performed secondarily to emptying of the bowel. Professor Bastianelli (who spoke in English) said that surgeons should adhere to the principle of not interfering with the primary tumour if obstruction existed. Only in some cases of tumour of the caecum was it proper to risk the violation of that principle, and mainly because an artificial anus in the caecal region was highly objectionable. He had never seen exhaustion result from the existence of an artificial anus. The ideal operation was primary excision of the tumour in one stage; it was certainly the operation of choice in right-sided tumours, and was applicable to all tumours except those situated low on the left side, where primary suture was practically impossible. The removal must be thorough and must include not merely a large portion of adjacent bowel, but the lymphatic apparatus as well. The death-rate in tumours of the right side was 9 per cent., and of the left side 15 per cent. Modern

technique could not bring about any great improvement in the results of palliative operations; these results really had nothing to do with the operation itself, but depended on the patient's condition. The principle not to attempt the radical operation in the presence of complications must be strictly adhered to. The comparatively slow growth of the neoplasm, with its late lymphatic and visceral dissemination and the possibility of earlier diagnosis, were important factors to consider. He had collected figures showing that, out of 239 cases, 140 were operative cures and 68 were alive and well more than three years after the operation—that was to say, 28.8 per cent. of all cases operated on. But he doubted whether these figures represented the truth. It must be kept in mind that some of the cases which survived for three years might die later of recurrence. When it was remembered that almost half of all large bowel tumours were inoperable, and that 75 per cent. of the other half survived the operation, and of these only 43 per cent. were well after three years, it was easy to see that, with all the present diagnostic and operative means, only 15 per cent. of all the people suffering from this disease could be saved. This proportion would be increased by earlier diagnosis and more generally perfect technique. Dr. A. L. Soresi (New York) demonstrated a method of end-to-end suture of the bowel which simplified the operation and permitted it to be accomplished by means of only one row of sutures. But as it appeared to require the employment of a piece of rubber tubing which was left in the lumen it was not regarded by some members of the Section as an advance. More statistics were contributed by Sir Frederic Eve, who said that 375 cases of malignant disease of the large bowel were treated in the surgical wards of the London Hospital in the period 1901–1911. The general mortality was 48 per cent. (Professor Körte's was 33 per cent.). The obstruction cases formed 61 per cent., as contrasted with Körte's 31 per cent. From these and other figures supplied he was of opinion that unless the local and general conditions for primary resection were distinctly favourable the average operator—in the London Hospital sixteen surgeons in all were responsible for the work—would best consult the safety of the patient by doing the three stage operation. The mortality had not increased since the extensive modern radical operations came into vogue; the mortality of resection with small margin of healthy bowel was 52.5 per cent., whereas the extensive operations of the Jamieson and Robson type had a mortality of only 29 per cent. Mr. Charters Symonds suggested that resection should be performed even in the presence of metastasis in the liver provided it were not extensive, and instanced a case in point where a patient lived for nearly two years after resection, even though there was a small metastatic deposit visible in the liver. Similiarly, in the anaemia found in such cases he thought it might be sometimes advisable to remove the original tumour, and he had known the anaemia to disappear completely after so doing. Appendicostomy, in preference to caecostomy in irremovable cancers, was recommended by Mr. W. G. Spencer (London). He held that if a large catheter (14 English) were introduced through the appendix into the caecum in such a way that fluid could be run in and faecal fluid siphoned off, it was a sufficient and a more suitable mode of treatment than the artificial anus. He did not believe that the regular passage of faeces irritated a cancer of the colon. Short contributions to the debate were made also by Mr. H. J. Paterson (London), Professor A. E. Barker (London), Professor Krynski (Warsaw), Dr. Keppich (Budapest), Dr. J. B. Murphy (Chicago), and Professor Hartmann (Paris).

Professor Bastianelli, in reply, expressed the opinion that the one stage operation was the ideal one. There was a technical as well as a clinical idea to be sought. Very extensive operations were sometimes easier to do than limited ones, as the bowel could be brought outside the wound in the abdominal wall. Whether or no the pathologists were right in regarding distant permeation as the rule, he favoured operations of a wide scope. He associated himself with Professor Körte in hoping for earlier diagnosis, but meanwhile early diagnosis was difficult and problematic.

The afternoon session on Thursday was occupied by reading and discussion of independent papers

Spinal Curvature Treated by Transplantation of Bone.

Dr. F. H. Albee (New York) gave an account of 175 cases of transplantation of bone, the grafts being taken from the tibia. Of these cases 145 were instances of spinal curvature. The grafts were fixed by splitting the spinous processes and laying the grafts firmly in these notches. In his experiments on dogs no attempt was made to fix the dog's spine, but in spite of that rapid growth resulted. In the cases of the human being his only treatment after the operation was to keep the patient for six weeks on his back on a fracture bed. Thereafter the patient was allowed out of bed without any support. The objects in view were to produce bony fixation, to prevent further progress of the deformity, and to correct that deformity by the mechanical support.

Arthroplasty and Osteoplasty.

Dr. J. B. Murphy (Chicago) gave a lantern demonstration of the clinical results attained in arthroplasty and osteoplasty. The object of his operations on those cases of bony ankylosis was to restore movement to the joints, so that the function of the joint should be as nearly normal as possible. In the case of the knee and hip joints he showed that excellent movement could be obtained sufficient to bear the weight of the patient, and to enable him to walk, run, and go upstairs. The general plan adopted was to restore the joint to its normal configuration. This was accomplished by chiselling and by rounding off the joint surfaces. The next important step was to introduce between those joint surfaces some structure which would prevent them uniting again, and the most satisfactory tissue was muscle and fascia. Numerous photographs were shown to demonstrate the results obtained. Cases of bone-grafting were also described, in some of which the pieces of bone transplanted were as long as 8 in. He held that regeneration of the bone took place, and that the periosteum was simply a limiting membrane, and was not directly concerned with the growth of bone. Results similar to these were also demonstrated by Dr. Mauclaire (Paris), who showed a number of photographs of the limbs and head where grafts had been employed. He employed the fascia lata to cover defects in the skull.

Rectification of Nasal Deformities.

Dr. H. Eckstein (Berlin) gave a lantern demonstration of the results he had been achieving in the rectification of nasal defects. The ordinary type of saddle nose could readily be treated by injection of hard paraffin, and he was also able in many cases to make good the loss of the tip of the nose by similar injection. Dr. Stein (Wiesbaden) criticized the employment of hard paraffin, and held that soft paraffin was less likely to give rise to embolism and thrombosis.

Skin Grafting.

The last paper for the day was read by the Secretary on behalf of Professor R. Minervini (Naples). He advocated the employment where possible of whole skin grafts taken from newly-born babies who had died within a few hours after birth. He was able in five cases to make excellent use of large grafts obtained in this way.

Cirrhosis of the Mesentery.

At the end of the meeting on Wednesday Professor Krynski (Warsaw) presented notes of a case which induced him to argue for the recognition of cirrhosis of the mesentery as a clinical entity. The patient had suffered for twenty-two years with abdominal pain, irregular attacks of constipation and diarrhoea, great increase in size of the abdomen, palpable tumour. Ileo-colostomy resulted in great improvement in symptoms. Pathologically the condition was a chronic inflammatory process, a fibrosis characterized by superabundant development of connective tissue and loss of fatty and elastic tissues.

ORTHOPAEDICS.

Treatment of Spastic Paraplegia.

The subject set for discussion on August 7th was the treatment of spastic paraplegia. This subject has been brought into prominence lately owing to the interest excited by the publications of Professors Foerster and

Küttner, of Breslau, concerning the operation which goes by the name of the former. The reporters were Professor Küttner, Mr. Muirhead Little, and Professor Vulpius, of Heidelberg. Professor Küttner was unable to be present, and his report was very briefly summarized in English by Professor Spitzy, of Vienna. Mr. Muirhead Little in his report gave a concise summary of the history of the treatment of infantile spastic paraplegia from the year 1843, when the condition now known as Little's disease was first described by W. J. Little, down to the present day, and a summary of what is known now of its pathology, and of the principles upon which surgical interference is based. Of late attention had been turned more and more to the seat of the mischief in the nervous system, and operations on nerves and nerve roots have been frequently performed. The *rationale* and the objectives of treatment were briefly dealt with, and selection of methods and classification of cases and the prognosis were considered. The operation of posterior rhizotomy, or diversion of the nerve roots, was first performed by Sir William Bennett for pain, in December, 1888, and in 1908 O. Foerster, of Breslau, applied it to a case of spasm. There was a consensus of opinion that this grave proceeding was only justifiable in the worst cases, and was not likely to be beneficial when the intellect was very weak. Consequently, it was only in the cases of the severest physical disability, combined with very slight mental disability, that the operation was indicated. As this combination was seldom met with, cases suitable for the operation were necessarily rare, but very striking results had been obtained in some cases. Whether these results would prove to be permanent time alone could show. In a case operated upon by Mr. Little after consultation with Dr. Purves Stewart, there was some improvement, but not complete relief.

The report of Professor Vulpius of Heidelberg dealt with the pathology of Little's disease and with the treatment of the contractions and the abolition of the spasm by operations on the tendons, nerves, and nerve roots, but even after the latter relapses were not uncommon. After-treatment was of great importance. The mortality of Foerster's operation was 8 to 10 per cent.

Next read was a paper by Dr. E. D. Macnamara and Mr. Laming Evans, giving their experience of three cases of spastic paraplegia operated upon by Foerster's method. In two there was some definite improvement, but in the third no benefit could be traced to the rhizotomy. The authors recommended the higher operation—namely, removal of the laminae and spines of the eleventh and twelfth dorsal and first lumbar vertebrae and exposure and division of the roots near their exit from the conus medullaris, because less damage was done in this way to the bones and it was easier to distinguish between the anterior and posterior roots than was the case near their exit from the canal. To mistake an anterior for a posterior root was far more serious than to mistake, say, the third for the second sacral root. There was some difficulty in estimating the line of separation between the third and second sacral roots, but the third sacral was the last large root given off from the conus, and if this was identified the rest was easy. Adrenalin was not used. Neither haemorrhage nor shock was severe. The spinal column was not appreciably weakened as the result of the laminectomy.

Dr. Redard (Paris) said that people were apt to forget, in the enthusiasm for operations on the nervous system, the good results of other operations and procedures. It must be remembered that spontaneous diminution or disappearance of spasm occurred in congenital cases. He thought that operations on tendons and muscles should be performed early—say at the age of 3 years—and he agreed with other orthopaedic surgeons in denying Professor Foerster's statement that operations on tendons had no effect in the way of reducing reflex excitability. In suitable cases the transplantation of tendons and osteotomy of the femur, both subtrochanteric and supracondylar, were all measures of value. As to the nerve operations, root section had a rather high mortality-rate. The statistics of cases were inexact as to the gravity of its effects and its results. Moreover, late results were practically unknown. In severe cases Foerster's operation was of slight value, and in cases of medium and slight severity equally good results, even absolute cure, could be obtained by other methods.

Professor Foerster's speech was delivered in German, and was practically the same as that which he had delivered in English at the Brighton Meeting. He exhibited a number of lantern slides of cases, and diagrams illustrating the vicarious paths of nerve impulses in different pathological conditions.

Dr. Murk Jansen (Leyden) gave an admirably clear *exposé* of the different plans on which the fibres of strong and weak muscles were respectively arranged, thus explaining the preponderating action of the strong when all were equally in spasm.

Professor Froelich (Nancy) preferred operations on muscles, tendons, and bones to those upon the nervous system.

Professor Spitzy (Vienna) referred to his well-known operations on the nerves. In spastic palsy of the upper extremity with pronator spasm it was important to see that the branch going to the pronator teres was inserted above the point of departure of the nerve going to the extensor digitorum. This method, combined with Stoffel's procedure of isolating and dividing the individual branches going to the spastic muscles when the end of the proximal portion of the divided nerve was inserted into the nerve to the antagonist muscle, gave good results and was less likely to be followed by relapse than was Stoffel's original method. Allison and Schwab's method of alcohol injection into the nerves had given him good results in the lower extremity, as also had ligature of the tibial nerve. If possible, it was better to divide the sensory fibres only in the limb instead of in the spinal canal. In his opinion Foerster's operation was not a very severe one; he (Spitzy) had operated on children as young as three years.

Professor Denucé (Bordeaux) said that he had divided the posterior nerve roots in one case. Three-fourths of the contraction had disappeared, but orthopaedic measures were necessary, and were still being employed.

The general impression made by this discussion, which proved to be most interesting, was that too much had been claimed for rhizotomy, and that the permanence of the results was doubtful, but that in otherwise hopeless cases it was justifiable, despite the mortality-rate of 13 per cent. (Foerster) and 20 per cent. (Galleazzi).

Pott's Disease.

The afternoon meeting of the Section was held at the Royal National Orthopaedic Hospital, where previously Dr. F. H. Albee (New York) had performed his osteoplastic operation for Pott's disease, on a patient of Mr. Muirhead Little, before a distinguished and appreciative gathering. The operation in practice seemed far simpler than on paper, and the use of the electric circular saw made the removal of the tibial bone graft easy and quick.

Congenital Dislocation of the Hip.

Mr. Jackson Clarke read an interesting paper on the open operation for some rare and refractory cases of congenital dislocation of the hip.

Dr. Torrance Rugh (Philadelphia) referred to a most interesting case of this dislocation which was easily reduced at 2 years of age; the head of the femur remained in the acetabulum for four months, was again replaced and remained in position for three years, was a third time replaced and remained so for six years, was for the fourth time replaced and only three months later had to be again reduced. This time an open operation was performed and a fracture of the head of the femur found.

Dr. Müller (Berlin) read a very long communication on the functional cure of congenital dislocations of the hip. He delivered it at a high rate of speed and in German difficult to follow. The gist of it was that fixation in apparatus and hyperextension gave good results. This paper was illustrated with lantern slides.

Dr. Froelich (Nancy), touched on some points on this so-called congenital deformity, and after Mr. Openshaw had approved of Mr. Clarke's procedure, and Dr. René le Fort had read a paper on pes cavus in children, tea was served and then a number of interesting cases were exhibited by the surgical staff.

SCOLIOSIS.

On August 8th the subject for discussion was the treatment of scoliosis. The reporters were Dr. R. W. Lovett of Boston and Professor A. Schanz of Dresden. Great interest was taken in this discussion, as owing to the publications of Dr. E. G. Abbott of Portland, Maine, and the reports from many quarters of the results obtained by the use of his method, this question has been given new interest.

The discussion was opened by Dr. R. W. Lovett of Boston, Mass., than whom no one has worked harder or devoted more pains and scientific knowledge to the investigation of the occurrence, causes, and means of cure of the deformity. Despite the fact that the principles on which Dr. Abbott's method is based are different to those upon which Dr. Lovett has been working, with true scientific candour he said that

> after a trial of all methods it seems to the writer as if the method of Abbott offered, on the whole, distinct anatomical advantages and the greatest ease of correction, but the method must be regarded as being to a certain extent *sub judice*.

Much confusion had, he said, been caused by failure to distinguish between true and false scoliosis. False or postural scoliosis was an easily corrected deformity, while true or structural scoliosis was characterized by a change in the structures of the spine and thorax, and was very difficult to treat. Some change in the intimate bone structure, rendering it less resistant to strain and pressure, must be assumed in the severe cases, although there might be no evidence of rickets. Surgeons had sometimes claimed cures of true scoliosis, when a more exact diagnosis would have revealed the fact that the cases dealt with were those of false scoliosis. Gymnastic treatment could not cure cases of moderate or severe deformity, while it might cure false scoliosis and slight cases of true scoliosis.

> A surgeon would be thought very much behind the times who to-day endeavoured to correct bony knock-knee or congenital club-foot by muscular exercise, yet many an up-to-date surgeon does not hesitate to advocate gymnastic exercise as the sole treatment of a bony deformity equally severe.

Were the results satisfactory, the practical result might justify the disregard of sound theory. But they were not satisfactory. Dismissing apparatus as of little use, Dr. Lovett reviewed the history of plaster jackets and forcible correction, which had given the best results so far, and concluded with the hope that a better agreement as to means of cure would be reached and still better results obtained in coming years.

Dr. Schanz (Dresden), after consideration of the etiology of scoliosis and the general principles to be adopted in its treatment, said that the correction to be obtained by plaster-of-Paris dressings and various forms of portable apparatus rather tended to lessen the carrying power of the spinal column. Hence every such correction cure carried with it a certain risk that, although the primary result was a diminution or removal of the deformity, there might be a late relapse, and the final result a much greater deformity than the first. At present it was not possible to bring every case of progressive scoliosis to a halt, and to retain permanently every correction result. The largest proportion of progressive scoliosis in young people was caused by the so-called late rickets. But this was not real rickets, but a disease the true nature of which still remained to be discovered, and on such discovery future progress in the treatment of scoliosis must depend.

THE ABBOTT METHOD OF TREATMENT.

A great deal of interest was taken in the paper by Dr. Edvillie G. Abbott, of Portland, Maine, and the Astrophysics Theatre of the Imperial College was crowded when he rose to read his address. Dr. Abbott did not go into much detail in discussing the pathology of scoliosis, but maintained that the bad position of the child at the desk was the cause or one of the chief causes of the deformity. He said that he had shown that a normal spine could be forced into the position of true scoliosis, and again corrected and forced into the opposite-sided deformity. Two things were to be striven for: first, overcorrection; secondly, maintenance of the spine in the overcorrected position until the parts had adapted themselves to the restored position so that relapse would not occur. This was just what was done in the treatment of such a deformity as club-foot. It was a flexion deformity, and by retracing the steps taken in the production of it, they could produce the opposite-sided deformity, compelling the parts concerned to travel back through the same arc through which they travelled in its production. Whatever may be thought as to the soundness of Dr. Abbott's views as to the etiology and pathology of scoliosis, there can be no doubt in the minds of orthopaedic surgeons who have experience of his method, that very great improvement if not absolute cure is to be obtained by its use.

Dr. Redard (Paris), whose work in forcible correction of scoliosis by his lever and gypsum jackets has been well known for years, said that they could not yet be sure of the permanence of Abbott's results, and relapses had been recorded. He preferred the prone position for the application of gypsum jackets to the supine position used by Abbott. In many cases two or three forcible corrections were enough, but in bad cases many more and treatment for years were necessary. He had had no serious accidents, and improvement had been produced in nearly all cases, but cure was not possible in all. He believed that the extensive structural modifications of bones and ligaments, etc., could not be corrected in a few months. After apparent correction the *x* rays showed very little real correction of the deformities in the spinal column, and the improved shape of the trunk was due to a change of the position of individual parts and not to change of their forms. He thought that the majority of Abbott's cases were of medium severity only, and that in the worst cases better results were obtainable with the speaker's method of forcible correction.

Dr. Max Böhm (Berlin), in a paper on congenital defects of development of the skeleton of the trunk, classified these as distortions, malformations, variations, bilateral asymmetry of congenital origin, and anomalous direction of growth on a congenital basis. The lantern slides of many defects of the vertebrae and other bones were of great interest. He said that the deformity of vertebrae in scoliosis was secondary to other changes of the whole trunk skeleton. After demonstrating the development of a vertebra and its division into elements, he referred to spina bifida and other clefts, but there might be fusion of parts or of whole vertebrae or ribs with one another. Cervical ribs were not the cause of scoliosis, which was due to accompanying vertebral defects.

Dr. Mauclaire (Paris) showed *x* rays of two unusual cases of primitive cervical scoliosis, in one of which there was deforming rheumatism of the vertebrae of the middle cervical region. The curves were very abrupt.

Professor Vulpius, who read a paper on some experiences with the Abbott method, said that there were great limitations to its usefulness. He was now of opinion that it should not be used in cases under 6 years of age and only in single curves.

Dr. Gourdon (Bordeaux) said that he had known cases apparently corrected by *redressement forcé* relapse after several years. The general health was of great importance, and often aggravation of deformity occurred after acute diseases, such as scarlet fever. Softening of the bones was the chief factor, and this cause should be treated by general hygienic measures. He believed that at present they were unable to rectify bony deformity, but they must direct their attention to counteracting rotation. There was no specific curative treatment.

Professor Spitzy (Vienna) said that the good results reported were due to changes of external form produced by changes in the thorax, but not in the spine.

Professor Froelich said that he believed that no scoliosis was ever really cured after torsion had developed. It was an abuse of language to speak of a cure of true structural scoliosis. Dr. Calot (Berck) showed some interesting photographs of patients treated by the Abbott method and very greatly improved. He had treated many cases, and he had entirely given up his former method in its favour. Dr. Lovett had referred to the difficulty of treating high curves. He did this by means of plaster coming right up round the head. When, as in some cases, the Abbott treatment was declined by the friends, he used a celluloid jacket with hinged doors on it for padding and correction, and such jackets were also useful to maintain correction.

Dr. Calvé said that they must distinguish between hypercorrection and compensatory changes. More exact records were wanted.

Dr. Louis Mencière (Rheims) thought that Abbott's method marked a considerable advance—active treatment by means of respiratory exercises in a jacket were important. This principle had guided him in the construction of his pneumatic auto-modeller, by which pressure could be exerted beneath a jacket. He was convinced that Abbott's principle of flexion added to that of the auto-modeller ought to change the prognosis in scoliosis.

Dr. Murk Jansen (Leyden) described a plaster bed for the side posture on the principle of Glisson's sling.

Dr. Lancy and Mr. P. B. Roth also spoke.

At the close of the morning session, Dr. R. W. Lovett proposed the formation of an International Orthopaedic Association to facilitate the interchange of ideas and literature. It was unanimously decided that the President, Mr. Robert Jones, and one representative of each nationality represented in the Section should form an organizing committee.

Club-Foot.

In the afternoon Professor Lucas-Championnière read a paper on his operation for club-foot. This, as is well known, consists in the heroic proceeding of ablation of the whole tarsus except part of the os calcis. Although he claimed to have secured good results, the Section as a whole was opposed to the procedure, Dr. Royal Whitman having the meeting with him when he said that it would be as well to perform Chopart's amputation at once. Dr. Calvé referred to the plan of subcutaneous removal of the bony nuclei of the tarsal bones in infants as if it had been introduced by Drs. Lamy and Jalaguier. Dr. Calot protested that the operation was Mencière's, from whom Lamy and Jalaguier had learnt it. Dr. Mencière explained that Dr. Calvé was mistaken, and that Professor Jalaguier had always given him the credit of it. It was not at all like Ogston's operation, as it was subcutaneous and could safely be performed in very young infants, in whom it was difficult to maintain asepsis owing to excreta, etc. Dr. César Roux (Nice) also spoke.

Professor Kirmisson read notes and showed *x*-ray pictures of cases of Volkmann's deformity of the ankle due to defect of the lower end of the tibia. Professor Froelich described similar cases, and showed *x*-ray pictures of deformity in which the lower end of the fibula was displaced backwards. Dr. Peckham (Providence, R.I.) read a paper on the treatment of weak foot. He said that bare-footed people had strong flat feet, but they did not turn them out in walking, but when such people took to wearing shoes their feet broke down. The artificial life of cities and badly designed boots produced weak and painful feet. Cure must be sought in restoration of tone and strength by gymnastics and mechanical treatment. Dr. F. Schultze (Duisburg) read a paper on club-foot, and showed many photographs of cases and of the elaborate and awe-inspiring machinery which he used in treating them.

ANAESTHESIA, GENERAL AND LOCAL.

The President, Dr. Dudley W. Buxton, opened the proceedings on Thursday morning with a brief address of welcome to the members. He pointed out that this was the first time that a Section had been devoted to anaesthesia at an International Congress of Medicine. He thought that the innovation was thoroughly justified by the enormous progress that had been made in this field in recent years; he compared the position of the speciality as it was thirty-two years ago, when the Congress last met in London, and as it is to-day. The number and complexity of the methods evolved during this period, the various combinations required in individual cases, all enhanced the importance of the anaesthetist's work, alike to the surgeon and the general public. He then called upon Professor Tuffier (Paris) to read his report.

Spinal Analgesia.

Without a single note Professor Tuffier gave a splendid review of the present position of this subject, of which he was one of the original exponents. He did not allow himself to be carried away by undue enthusiasm, but was perfectly fair and unbiassed. Speaking partly in French and partly in English, always fluently and yet, as his countrymen say, *doucement* he was easy to follow. He described first of all the extradural method, which is a more novel procedure and something between spinal analgesia as usually understood and regional analgesia; the puncture is made between the sacrum and coccyx. The procedure, he said, was free from all danger, but the analgesic results a little uncertain. In dealing with the usual intradural method he described the technique and reviewed the various drugs in use, giving his preference to novocain. He did not approve the addition of either strychnine or adrenalin, nor of the combination of spinal with general anaesthesia. He thought all failures were due to the surgeon not delivering his injection within the theca. He compared the relative mortality of spinal with that of general anaesthesia, and confessed that it was impossible to draw any sure conclusions so far as the lumbar puncture method was concerned; he considered Jonnesco's high puncture dangerous and did not employ it. Contraindications were: all operations above the umbilicus; highly nervous subjects, especially children; and, lest the operator might be blamed for recrudescence of symptoms, syphilitics and those who had suffered from disease of the spinal cord. Mr. L. McGavin agreed that the extradural method was uncertain, but he did not admit that spinal analgesia was contraindicated in syphilitics and children. After trying Jonnesco's method in eighteen cases he had abandoned it owing to its danger. If pyaemic cases were excepted, he did not think there were any contraindications to spinal analgesia. There was, he thought, a prejudice against the method in England. He referred to some statistics which had been published showing a very high death-rate, and put forward statistics showing a low mortality. Mr. Leedham-Green limited his remarks to the extradural method, which he had found somewhat unsatisfactory. Mr. Victor Fielden expressed the view that, owing to the impossibility of ascertaining beforehand the dose required by each individual, there was always a danger of administering a dose which might be too small or too large. Mr. Tyrrell Gray adduced the results of his well-known experiments, and propounded what, for want of a briefer term, one may call his theory of "synapses." Very ingeniously he argued that in the presence of spinal analgesia trauma of the peritoneum could only be highly beneficial. He considered children particularly suitable subjects for this method. After a few remarks by Dr. le Filliatre, the President deprecated the idea that British anaesthetists were prejudiced against spinal analgesia, which occupied a very useful place in their armamentarium. He thought it was hardly fair of Mr. McGavin to compare the statistics of a few highly trained exponents of spinal analgesia with those of general anaesthesia, obtained, as they were, from the practice of all and sundry. Professor Tuffier briefly replied.

Local and Regional Analgesia.

Professor Dr. A. Braun (Zwickau, Saxony) spoke in German, but any difficulty owing to this became obviated by the courtesy and forethought of the President in supplying in advance a translation of the report. Dr. Braun stated that in many German hospitals local or regional anaesthesia was used in quite 50 per cent. of operations. His report was a complete review of the various ways by which the part to be operated upon may be rendered insensitive; these methods were infiltration of the tissues themselves, perineural injection of the nerves supplying them, Bier's intravenous method, and the intra-arterial method; the range of operations for which he employed these methods extended, he said, from mere superficial operations on mucous membranes to those on deeply-seated organs in the pelvis and even to the brain. Much of the report was devoted to the intra-arterial method, which is as follows: An artery having been exposed, the circulation in the limb is stopped by means of a tourniquet and from 50 to 100 c.cm. of a ½ per cent. novocain solution injected into it; analgesia develops in from one to two minutes; after completion of the operation the tourniquet is removed and sensation rapidly returns. For infiltration Dr. Braun said he used a 0.5 per cent. novocain solution combined with adrenalin; for peri- and endo-neural injections a 1 to 4 per cent. solution. Some excellent photographs illustrating his methods were

passed round during Dr. Braun's speech. Mr. Leedham-Green stated that he was now doing 50 per cent. of his major operations under infiltration analgesia. He also preferred novocain; his experience with quinine and urea hydrochloride had been unfavourable. He had found the infiltration method particularly useful in operations on the skull. He also gave some details of his experience in perineural methods. Professor Dollinger said that in his practice local analgesia was now the rule and general anaesthesia the exception. Dr. H. H. Schmid (Prague) also spoke.

Lumbo-Sacral Cocainization.

Dr. G. le Filliatre then read a paper on his thirteen years' experience of general anaesthesia by lumbo-sacral, spinal cocainization.

RECENT METHODS OF GENERAL ANAESTHESIA.

In the discussion on recent methods of general anaesthesia those considered were (*a*) open ether; (*b*) rectal; (*c*) intravenous; (*d*) intratracheal; (*e*) nasal; (*f*) alkaloidal bodies alone or in conjunction with general anaesthetics; (*g*) nitrous oxide in major surgery; (*h*) dosimetric chloroform. Though described as recent methods it must be confessed that many of them have lost their first bloom so far as this country is concerned. Take "rectal ether" and "nitrous oxide in major surgery"; these were both investigated many years ago, the method of administration described, and apparatus provided by Dr. Dudley Buxton and Sir Frederic Hewitt respectively. They have, however, been rediscovered. Coming to more recent times, "dosimetric chloroform" has certainly been advocated and practised in Great Britain for the past ten years at least; and "open ether" was brought to our notice by Dr. Goodman Levy at the British Medical Association meeting held at Exeter in 1907. The other methods have all been frequently discussed and practised during the last year or two.

Open Ether.

The report on open ether was read by Dr. R. H. Ferguson (New Jersey, U.S.A.), who after enumerating the requirements of a good open ether anaesthesia, foremost among which he placed the constant and steady supply of vapour by the drop method, described his procedure and exhibited his apparatus. He uses a mask with a copper wire frame which can be bent to fit the face. In some cases it was desirable to use a Hewitt's oral airway, and he found that occasionally with beginners too rapid dropping would lead to liquid ether dropping right through the mask. To obviate this he showed a modification he had devised having the air openings at the side. It might be termed a "fool-proof" oral airway. Apparently it is the custom in America to anaesthetize patients with the face upturned, instead of, as usual in this country, with the face turned to one side. Dr. Ferguson's mask is surrounded by a sort of curtain open at the top, which to some extent limits the waste of ether vapour. This communication was commented upon by the President, Dr. McCardie, Dr. E. Arrias (The Hague), and Dr. Lloyd. In his reply, Dr. Ferguson stated that he only used about four ounces of ether an hour, and did not employ a previous alkaloidal injection.

Rectal Ether.

At this point the Section adjourned. When it resumed on Friday morning, Dr. J. H. Cunningham (Boston, U.S.A.) made his report on rectal ether. He considered that the principal indications for this method were operations on the head and neck, and the presence of affections of the lungs. It was contraindicated in abdominal operations owing to the distension of intestine caused, and doubly so where disease of intestine, past or present, was suspected on account of the liability to diarrhoea and bloody stools as a post-anaesthetic effect. Another drawback was the length of time required for induction. Dr. Cunningham described his technique and apparatus; in the latter he favoured simplicity; he had tried some more elaborate apparatus, but declared, with unconscious humour, that it had no "fundamental" advantage. Professor Arndt (Bern), who followed, said he was opposed to rectal etherization in children. Dr. A. F. Flemming (Bristol), who said that he had used Buxton's apparatus some years ago, had found the induction long, and diarrhoea very apt to follow. He had tried ether dissolved in saline, but found it was very uncertain in results. The President mentioned that he had introduced the method twenty-five years ago. He thought it particularly useful in young children, especially in operations for cleft palate. Diarrhoea, and so forth, was caused by liquid ether being condensed in the tube and getting into the bowel; this danger was obviated in his apparatus by an interceptor. He preferred to induce anaesthesia first by an inhalation method. Professor Meltzer and Dr. Gwathmey of New York and Dr. Nagle of Toronto also spoke.

The Intravenous Method.

The discussion of this method was introduced by Professor Burkhardt of Nurnberg, who spoke in German, but read some portion of his report in English. Dr. Burkhardt's views and work are already well known. He advocated the use of ether because the dose was easily controlled and the drug was rapidly eliminated. The percentage should not be higher than 5, lest haemolysis should occur; the rate of flow was not more than 70 to 80 c.cm. a minute. In 600 cases recoveries were good and serious complications rare. Other substances had been employed experimentally—urethan, hedonal, chloral, isopral, veronal, medinal, choralamyd and paraldehyde. Of these, hedonal and isopral (he might have added paraldehyde) had been used clinically. Owing to the fall of blood pressure, the difficulty of regulating the dose, the prolonged sleep, and danger of respiratory paralysis, he deprecated the use of the former. Isopral was not so dangerous, but caused the blood pressure to fall, was difficult of solution, and had to be infused slowly. The paper was discussed by Professor Kümmel of Hamburg, Dr. Z. Mennel (who described his technique and results with hedonal), Dr. Shipway (who considered the application of ether limited and hedonal dangerous), and the President (who dwelt on the necessity of mastering technique and selecting cases).

Intratracheal Ether.

Professor S. J. Meltzer (New York), the originator of this method, said that he had evolved it from laboratory experiments. To prove that it was impossible for vomited matter to find its way into the trachea whilst ether was being driven into the lungs under pressure he had injected cats with apomorphine during the anaesthesia, and demonstrated the absence of inhaled vomit. The method did away with a great part of the "dead space." Its use was not followed by laryngeal or pulmonary trouble. The method called for some practice to acquire thorough mastery of technique. Any accidents that occurred were not the fault of the method but due to bad handling of it. The paper was very thoroughly discussed, and most speakers showed their own apparatus. Dr. Elsberg (New York) spoke highly of its value. In addition, the apparatus, used without ether, was a valuable substitute for artificial respiration. Mr. Boyle and Dr. Shipway (London) both gave their experience of the method, and recommended the passage of the catheter by direct vision with the laryngoscope of Dr. Hill's pattern. Dr. R. E. Kelly (Liverpool) mentioned an extremely bad case with chronic bronchitis in which he had used the method with great success, and no post-anaesthetic troubles had developed. Dr. Nagle (Toronto) gave the results of his observations in 300 cases. He used the direct vision method of introducing the tube. Dr. Meltzer, in his reply, pointed out that although in the laboratory it was quite possible to keep animals alive for prolonged periods without any respiratory movements, it must not be taken that he recommended this practice clinically; even in intrathoracic operations it was wise to allow a few shallow breaths per minute.

The use of Alkaloids Alone or with a General Anaesthetic.

The discussion on this subject was dealt with by Dr. Karl Gauss of Freiburg, and discussed by Dr. McCardie and Dr. P. Giuseppi. The former objected to their use in such doses as to render anaesthetics unnecessary, but considered them a valuable adjunct to anaesthesia. He believed in a combination of drugs, the effect being greater than the sum of the action of the individual

drugs employed. Omnopon was less depressing to the respiration than morphine alone. Contraindications were the Trendelenburg position, the use of chloroform, bronchitis and emphysema, operations on the brain, obesity, ureteroscopy, kidney disease, and extreme youth. Dr. Giuseppi dealt with the use of alkaloids in childbirth. He emphasized a point which did not appear to be generally known—namely, that if tablets are used they should not be dissolved in tap water, as hard water precipitated alkaloids (the neglect of this precaution probably accounts for many anomalous results). They were best given in the second stage of labour. The fetal heart should be auscultated at intervals.

Nitrous Oxide-Oxygen.

In some ways Professor Teter's (Cleveland, U.S.A.) report on nitrous oxide-oxygen in major surgery was one of the most important of the day. This method has been for years employed occasionally by anaesthetists in this country, the main difficulty being to secure a smooth and satisfactory anaesthesia. Professor Teter claimed that by improved technique and apparatus and much assiduity in practice he had solved the problem. He showed his apparatus and explained the main principles of his technique, which were: (*a*) The use of pre-anaesthetic narcotics; (*b*) absolute purity of oxygen used; (*c*) a definite and even flow of gases; (*d*) warming the gases; (*e*) rebreathing the gases (at intervals); (*f*) maintenance of positive intrapulmonary pressure. Professor Teter was warmly supported by his countrymen, Drs. Gwathmey, Nagle, and Davison; but all emphasized the necessity of complete mastery of technique, which could only be attained by serving a long apprenticeship. Drs. Guy and Ross, of Edinburgh, gave an account of their experience with an apparatus of their devising, which they claimed combined the accuracy of Professor Teter with far greater simplicity and economy, not only in original cost, but in gas consumption.

The last paper was the President's report on dosimetric chloroform. The advantages of this method have been so fully set out in these columns, and, as the report of the Anaesthetics Committee of the British Medical Association showed, rest on so sound a physiological basis, that it is unnecessary to recapitulate them. Dr. Buxton gave a masterly exposition of the case for regulating inhalers. He was followed by Dr. Embley (Australia), who supported him on the physiological side, and Professor Waller, who gave a practical demonstration on cats.

Intramuscular Injections of Ether.

With the session on Saturday the proceedings of the Subsection reached high-water mark. The meeting was fully attended, many members of other Sections being present to listen to or take part in the discussions introduced by Professors Crile and Yandell Henderson. The debate was maintained at a high level and the views of the various speakers supported by an eloquence and earnestness that arrested attention. Altogether it was an intellectual treat.

The proceedings were opened by Dr. P. Descarpentries of Roubaix, who read his paper on general anaesthesia by intramuscular injections of ether. Dr. Descarpentries, speaking in French, said that under his technique the method was as free from risk and danger as any other, and had special advantages in operations on the head and neck, in those undertaken immediately after injuries and where skilled assistance was unavailable. He administered the ether in successive injections, varying in amount, according to the patient's age, from 2 c.cm. to 5 c.cm. each. The site chosen was the gluteal region, and the injections were made into each side alternately. The total amount used was inconstant, but roughly 1 c.cm. for each kilo of body weight. He compared the results obtained with those of anaesthesia by inhalation of ether, and showed an apparatus he had designed for the latter purpose with the special object of presenting a warm vapour. The President observed that the method was on its trial, and expressed a little doubt as to whether it offered any advantages over the more recent methods of inhalation anaesthesia. Dr. Descarpentries's inhaler appeared to be ingenious and on the right lines, but its value could only be proved by use.

ANOCI-ASSOCIATION.

Dr. Crile then submitted his report on anoci-association, by which he understood the exclusion of all nocuous influences, psychic or traumatic. Inhalation anaesthesia abolished consciousness, but did not put the brain cells to sleep; they continued to discharge energy in response to stimuli under the lipoid anaesthetics, and to a less degree under gas; latent energy was converted into kinetic energy by oxidation. He regarded increased respirations on the part of the patient, commonly seen in response to surgical stimuli, as an unconscious attempt to cry out. Fear had the same effect as traumatism on the brain cells. He illustrated the changes in the brain due to fright, want of sleep, fatigue, and traumatism by throwing on a screen lantern slides of microscopical sections of brains of animals killed under these conditions side by side with sections of normal brains of the same animals. He regarded these changes in the brain cells as the cause of shock. The brain cells were the bank on which the operation was frequently the overdraft. The object in anoci-association was to preserve them from psychic shock and from traumatic shock. The former was accomplished by submitting the patient daily for a few days to a short inhalation of gas and oxygen, ostensibly as part of the treatment. One day the patient was carried from his bed whilst anaesthetized to the operation theatre. In order to prevent afferent stimuli reaching the brain a complete infiltration analgesia was then done as thoroughly as if no anaesthetic were to be given. The operation was then performed, the utmost gentleness being used in case nerve blocking might not have been complete. A very light anaesthesia was maintained, and under this the passage of any traumatic stimuli to the brain was evidenced by increased respiration. Contrary to the usual custom of the surgeon warning the anaesthetist that the anaesthesia was too light, he expected his anaesthetist to warn him, as it was the surgeon who made the anaesthesia too light either by using too much force or through inefficient nerve blocking. The CO_2 content of the blood was kept up by occasional rebreathing. After operation the anaesthesia was maintained until the patient was back in bed in the same position and surroundings as before. In a minute or two he awoke, and his condition was in no way different to that in which he found himself on awakening on previous days. Under this system the mortality had fallen from 6.2 per cent. to 0.8 per cent. The address, delivered in a quiet, almost conversational manner, with an air of conviction and many apt illustrative comparisons, was followed with deep attention and ended in an outburst of applause. The President congratulated Professor Crile on his work, and questions were asked by Dr. Wilson (Manchester), Mr. Carter Braine, Dr. Barton, and Dr. Flemming (Bristol). Mr. Warren Lowe said that he had found the method all that Dr. Crile claimed in some cases in which he had tried it. Mr. Tyrrell Gray thought that, in abdominal operations, at any rate, local analgesia did not cause complete nerve blocking, and that spinal analgesia was the only reliable means. Chromatolysis of the brain cells was no doubt associated with shock, but was not, in his opinion, its cause. Major Battye, I.M.S., as a result of his experience in India, recommended the combination of light anaesthesia with spinal analgesia. Dr. McCardie (Birmingham) pointed out the difficulties of carrying out the method in its entirety in hospitals owing to the demands on the beds. Professor Teter, who had administered the anaesthetic in many of Dr. Crile's cases, was eulogistic, as also were his fellow countrymen, Drs. Ryan and Robertson. Dr. Arrias (The Hague) and Mr. Fletcher also spoke and Professor Crile replied.

SPINAL AND LOCAL ANAESTHESIA CONTRASTED WITH INHALATION ANAESTHESIA.

Professor Yandell Henderson (New Haven, U.S.A.) submitted his report contrasting the immediate and after-effects of spinal and local analgesia with inhalational anaesthesia, particularly with regard to shock and psychic shock. He said shock might be the result of mental states—for example, fear or anxiety—in much the same manner as it was of physical pain, although in less degree. In using local and spinal analgesia it was important that the mind also should be protected, unless the patient was of phlegmatic character. In general anaesthesia not only the

consciousness of pain was to be avoided, but also over-stimulation of the nerve-centres controlling vegetative functions. Shock was not, however, fatigue of such centres, but consisted in a general depression of vitality resulting from excessive respiration (induced by abnormally intense afferent irritations and by ether excitement), from over-stimulation of adrenalin secretion, and from disturbance of other general functions. The acapnia theory of fatalities under anaesthesia (presented in some detail) taught that excessive respiration during the stage of excitement, especially under ether, produced alterations of function which, if the method of anaesthetization was sufficiently unskilful, might render even a perfectly healthy man or animal liable to fail under a dosage which would otherwise have been borne with impunity. The use of "re-breathing" methods in connexion with nitrous oxide-oxygen anaesthesia was touched on, also the use of oxygen containing a small amount of carbon dioxide. Some amusement was created by Dr. Henderson stating that a dog kept in a stage of ether excitement for twenty minutes developed acapnia; if then ether were suddenly pushed to narcosis, respiration stopped, and the "dog did not breathe again till it was dead," a hibernicism which was relished equally by the speaker and the audience. The President congratulated the reporter and called upon Mr. Tyrrell Gray, who, eloquent and persuasive as ever, submitted that during an operation every surgical stimulus acted on the vaso-constrictors, sending up the blood-pressure (pressor stage) until the centre became paralysed from exhaustion, when the contrary effect was produced (depressor stage). Comparing shock values of different tissues, the general rule was that the deeper-seated and more protected the part the higher the shock value. Contrary to some recently expressed opinions, strychnine, on his theory, could only do good in shock. Dr. Mortimer agreed that spinal analgesia prevented shock from afferent impulses, but it intensified psychic shock. He advocated the combination of analgesia and anaesthesia where shock was anticipated. Dr. Dickie (Middlesbrough) said that spinal analgesia itself was frequently associated with a set of symptoms clinically indistinguishable from shock. In 400 cases these symptoms were very pronounced in three, of which one was fatal. Dr. Henderson replied.

OBSTETRICS AND GYNAECOLOGY.

AT the opening of the Section on Thursday, August 7th, the President (Sir Francis H. Champneys) briefly welcomed the members, and forthwith called on Professor Döderlein (Munich) and Professor Essen-Möller (Lund) to introduce the first subject for discussion.

TREATMENT OF HAEMORRHAGE FROM THE PLACENTAL SITE IN THE LATER MONTHS OF PREGNANCY.

The natural tendency for this subject to fall into two divisions (haemorrhage unavoidable and haemorrhage avoidable) was accentuated by the decision of the reporters to choose one division each. This arrangement made the discussion, it must be admitted, rather disjointed, but it became perfectly clear that the Section was unanimous in dividing cases of haemorrhage into two groups for purposes of treatment—those for whom the facilities of a hospital were available and those for whom they were impossible or were refused. Almost every speaker urged this distinction, and many insisted that all cases of haemorrhage were as clearly cases for treatment in hospitals or nursing homes as any acute surgical condition. Professor Döderlein, in discussing placenta praevia, conferred a boon by grouping the statistics of a very large number of cases. These included series by the following methods of treatment: (1) Artificial dilatation by bags, (2) tamponage of the vagina, (3) by the Braxton Hicks method, (4) intra-amnial metreuryse, (5) abdominal Caesarean section, and (6) vaginal section. He favoured operative measures, particularly vaginal section, in severe cases when facilities were possible, but was still prepared to keep an open mind on the whole question, and all the more so since the "obstetrical" methods gave a very low maternal mortality. Professor Essen-Möller, who limited himself to the pathology and treatment of accidental haemorrhage, referred to the recent discovery that the uterine muscle is frequently at least the site of the haemorrhage. He considered that a small group of cases was directly attributable to trauma, but that by far the larger group had an association with albuminuria, such as to suggest some general intoxication. He drew comparisons between eclampsia and accidental haemorrhage, particularly in regard to the albuminuria and haemorrhage. He advocated Caesarean section (abdominal or vaginal) for serious cases with closed cervix where the condition made rapid delivery necessary; hysterectomy should only be done when contraction remained obviously deficient after removal of the child and placenta. He doubted the efficacy of the Rotunda Hospital method, and in cases of moderate severity would try the effect of rupture of the membranes. So far as the discussion related to placenta praevia, there appeared more or less a consensus of opinion that the Braxton Hicks method for most cases and Caesarean section for severe cases with closed cervix gave the best prospects. Dr. Munro Kerr (Glasgow) urged that the latter should not be postponed till late. Dr. Murdoch Cameron was by no means enthusiastic as to Caesarean section, but Professor Recasens (Madrid) was sufficiently convinced of its merit to have done it where the child was dead. Professor Jardine (Glasgow) recommended pituitary extract for all cases of haemorrhage, but Professor De Lee (Chicago) pointed out that there was a danger of rupture of the uterus following this drug. Professor Davis (Philadelphia) regarded the condition as being essentially similar to ectopic gestation, and therefore treated it on surgical lines. He had had fourteen Caesarean sections, with recovery of all the mothers and of all the viable children. Professor Paul Bar (Paris), and several other speakers, called attention to the possibility of an aggravation of shock following section. In discussing accidental haemorrhage, Sir John Byers (Belfast) remarked that, when concealed, it gave rise to an appearance suggesting "something behind the bleeding." He thought that rupture of the membranes was bad if it delayed labour, and recommended the Rotunda Hospital method of packing, combined with the administration of pituitary extract and isotonic salines. Professor Jardine described two cases of concealed haemorrhage where the condition was too serious for section, and yet the patients recovered under the use of pituitary extract, salines, and morphine; such cases pointed a moral. Dr. Hastings Tweedy (Dublin) described thorough plugging of the vagina and its fornices as being invariably successful in arresting haemorrhage by pressing on the big vessels; the patients, however, might still be in danger. Professor De Lee expressed the opinion that these cases were comparable to acute haemophilia.

SYMPHYSIOTOMY.

At the afternoon session several interesting papers were read before the Section. Professor Fritz Frank (Cologne) spoke enthusiastically in favour of subcutaneous symphysiotomy, based on an experience of 117 cases. He narrated the indications (largely flat pelves), the technique, and the after-results in his cases. Among the contra-indications he did not include infection. Professor Munro Kerr agreed with most that had been said, but thought that there was little difference between symphysiotomy and pubiotomy; that the operation did not interfere with locomotion, but that it ought not to take the place of high forceps, and should not be done in a first confinement.

TREATMENT OF PYELITIS.

Professor E. P. Davis (Philadelphia) advocated surgical intervention (nephrotomy) in cases of pyelitis of pregnancy resisting ordinary medicinal treatment. He was against the induction of labour, which might still further light up the infection.

EXTERNAL HYSTEROGRAPHY.

Professor Fabre (Lyons) described a very simple apparatus by means of which he had studied the uterine contractions during pregnancy, labour, and *post-partum*. Different types of contraction had been noted, and it had been found possible to foretell the type of contraction in labour. The action of drugs had also been studied with ease.

OTHER PAPERS.

Short papers by Professor Recasens on homologous organo-therapy in certain gynaecological complaints—that is, the injection of preparations of ovaries removed mainly in operations for fibroids—and by Professor Nubiola on

electrographic observations during pregnancy brought the session to a close.

On Friday the Section met in the morning with the Sections of Diseases of Children and Hygiene and Preventive Medicine for the discussion of mortality during the first four weeks of life (see page 401).

Postural Version.

At the meeting of the Section of Obstetrics and Gynaecology in the afternoon, Dr. A. F. A. King read a paper on postural version by thigh pressure in transverse presentations. He suggested that a very powerful influence could be brought to bear on a fetus lying transversely by an assumption of the squatting position, with the body bent forward and the foot advanced on the side where the breech lay. By this means pressure was brought to bear in the very directions necessary for successful external manipulation. Professor Davis, in discussing the paper, made a plea for the more general adoption of postural aids in obstetrics.

Operation for Sterility due to Cervical Stenosis.

Professor Pozzi (Paris) described his operation for cervical stenosis associated with sterility. By its means the canal was widely opened up and kept in the open position with excellent results. Dr. H. Spencer (London) said that he had practised the operation for several years, following Professor Pozzi's technique, and had had every reason to be very well satisfied with it. He considered it much superior to simple dilatation, and regretted that it had received so little recognition in English-speaking countries.

Operation for Chronic Inflammation of the Appendages.

An interesting and original operation for chronic inflammatory disease of the uterine appendages was described by Professor Beuttner (Geneva). Recognizing the advantage of preserving the menstrual function, he had found it possible in some cases to leave one ovary while removing the tubes and the other ovary in one piece with a large slice of the body of the uterus. This excision was performed through parallel incisions along the fundus; the part removed was transversely wedge-shaped.

The Secretion of Milk.

Miss A. Louise McIlroy (Glasgow), in a paper on some factors which influence mammary secretion, expressed the opinion that in the ovary was to be found the controlling influence on mammary hypertrophy and on lactation. In favour of this view were the hypertrophy at puberty and the atrophy at the menopause and after castration. She had found menstruation to occur during lactation much more frequently than was supposed. She had noted, too, a peculiar toxic condition of infants during the mother's first menstruation, and hoped that this subject would be more fully investigated. The average duration of lactation in her cases lay between nine and twelve months. Pregnancy occurred in 9 per cent. of lactating cases where amenorrhoea was present, and in 20 per cent. where menstruation was not in abeyance. There was no evidence of uterine control or of nerve or corpus luteum influence, and the results of experiments in relation to the fetus were contradictory. She had failed clinically to confirm Schäfer's experiments on the galactogogue action of pituitary extract, and thought it most probable that the supposed increase was due merely to an emptying of the lactiferous reservoirs.

OPHTHALMOLOGY.

Discussion on Chronic Uveitis.

The discussion on Thursday was on the pathogenesis of chronic uveitis, excluding the syphilitic, tuberculous, and sympathetic varieties. It was opened by Professor Fuchs (Vienna), who treated the subject from the pathological aspect and showed slides illustrating the chief points to which he called attention. Professor de Schweinitz (Philadelphia) discussed the disease from the clinical and bio-chemical aspects. The material on which he drew was derived from the literature of the last ten years, a collective investigation of the views and experiences of his American colleagues, and a study of the so-called gastro-intestinal autointoxication in relation to these affections. In one set of cases the disease began in the choroid and spread forwards, and in the other it commenced in the iris and spread backwards. In all probability every case of uveitis was of septic or toxic origin, while the infection might be endogenous or exogenous. At present he was only concerned with the former, which arose from certain infectious diseases, or internal areas of suppuration, or disturbances of metabolism. Among these might be mentioned gout, rheumatism, diabetes, influenza, gonorrhoea, specific fevers; certain blood diseases, such as anaemia, renal disease, and autointoxication; diseases of the pelvic organs, nose, teeth, pharynx, accessory sinuses, and the skin. Acute articular rheumatism was excessively rare as a cause. Persons suffering from muscular rheumatism and chronic polyarthritis developed the disease, but such cases were probably auto-toxaemias, and had nothing whatever to do with rheumatism. Chronic arthritis was well known to arise from a number of different infections, some being bacterial and some metabolic in origin. The relationship between it and gout was very vague, but the etiology of the disease was so obscure that all etiological factors should be considered until they were definitely disproved. The effect of diabetes and gonorrhoea was well known, and now much attention was bestowed upon oral sepsis. In this connexion it was to be remembered that it was quite unnecessary that a general oral sepsis should be present or an extensive pyorrhoea. The infection could quite well arise from a single carious tooth or a tooth-root abscess. Some dental surgeons believed in the influence of constitutional disease in the etiology of pyorrhoea, but although it might be a predisposing cause the ultimate cause was practically always local. It was not possible to prove absolutely that bacterial toxins circulating in the blood did cause localized inflammation of the uvea, yet it was certainly not possible to deny that such might be the case. The examination of the urine and the whole metabolism ought to be made, and although the presence of indican in the urine was presumptive evidence of intestinal intoxication, yet its absence could not be taken as proof that such decomposition was not taking place. He concluded that articular rheumatism was never in itself responsible for the disease, and the term "rheumatic iritis" should disappear. Professor Axenfeld (Freiburg) thought that it was very difficult in these cases to exclude tuberculosis. Most *post-mortem* examinations showed tuberculous lesions in the past which had never given rise to symptoms during life. It was more than likely that most of the cases had a tuberculous origin, which although at one time it might be fairly obvious, yet later on might be altogether unrecognizable. He thought that tubercle was far more common than was usually thought, and although there might be other causes, he considered tubercle by far the most common and important. Dr. Angelucci (Paris) declared that myopic choroiditis was, in his opinion, usually of septic origin. Professor Fuchs, in reply, agreed that in most *post-mortem* examinations there was evidence of past tuberculous lesions, but he did not think that this was conclusive, or proved that all or most of the cases were of tuberculous origin. He considered that practically all people had some tuberculous lesion at some time or another, but very few suffered from uveitis. Professor de Schweinitz also briefly replied.

Independent Papers.

Etiology of Conjunctivitis.

Professor Angelucci read a paper on the influence of seasons of the year in the development of conjunctivitis. A notable increase was found in Southern Italy with a rising temperature, and in Egypt there were two seasons of the year in which a rise was always noted—the commencement of the summer season and in the autumn. In the south of Italy irritable cases of trachoma became worse when the temperature rose in the summer.

Age and Accommodation.

Mr. Ernest Clarke (London) read a paper on the influence of age on the accommodation. He alluded to the work of Donders on presbyopia, and bore tribute to the wonderful accuracy of his statements, which had stood

the test of fifty years. He had himself now made observations on over 3,000 individuals, and in all under 45 years of age he had used a cycloplegic. The result was that he found the average accommodative power higher than that ascertained by Donders, who had not always employed a cycloplegic. Mr. Clarke showed many diagrams, and insisted on the importance of always ascertaining the patient's near point, for a low accommodative power was usually due to premature senility; the most common cause was intestinal stasis and eyestrain. It was the duty of the ophthalmic surgeon to warn all persons with low accommodative power that there was something wrong in their general condition and the advice of a physician should be sought. It was quite as important to correct all refractive errors in presbyopes as it was to do so in young people, in order to avoid waste of nerve energy, and there were great facilities now for doing this by the employment of the "invisible" bifocal glasses.

Ophthalmic Progress in Egypt.

Mr. A. F. MacCallan (Egypt) said that in 1903, owing to the liberality of Sir Ernest Cassel, ophthalmic work was seriously considered by the Government, and in 1906 the travelling hospitals which had been established were placed under a special branch of the Egyptian Government when the first permanent hospital was built at Tanta. Between 1904 and 1912 eight ophthalmic hospitals were opened by the Government. During 1913 six new hospitals were expected to be inaugurated. For these fourteen both the initial outlay and the cost of maintenance were assured. Both permanent and travelling hospitals had a place and a work to do in the country. Each camping ground for the travelling hospitals was occupied for from four to six months, and in this way most of the larger towns in Egypt had been visited. There were three types. The most completely equipped had two surgeons attached to them, and they could treat between 200 and 300 patients a day. The second type was smaller and had one surgeon, and could look after from 100 to 150 patients a day. Both of these types had accommodation for in-patients, while the third type had no in-patient accommodation, but could deal with from 100 to 150 patients daily. The administration of these hospitals was vested in the director, with the assistance of two British and one native inspecting surgeon. The subordinate staff consisted of twenty-three Egyptian surgeons at the present time. They had had special ophthalmic instruction, and most of them made good operators in simple cases, while some had attained very great technical skill as ophthalmic surgeons. More than 90 per cent. of the population suffered from trachoma, so that there were necessarily a large number of lid operations to perform. A very great improvement had already been noted in the schools as the result of the work of the hospitals, and the author laid stress on the great help and assistance which had been given in this direction by Lord Kitchener, who took the keenest interest in all that was being done in this direction. There was a vast amount of work still to be done, and it was a fact that 16 per cent. of those who attended the hospitals were hopelessly blind, so that it was obvious that no effort should be spared in order to extend the beneficial work which was being carried on in this country. Professor Likurnik spoke of the treatment he adopted for the cure of trachoma by massage with a glass knob on a handle, which was passed between the upper lid and the eyeball. Dr. Myerhof did not think that this method would be possible in Egypt, and he far preferred the excision of the trachoma tissue. He spoke very highly of the work of Mr. MacCallan. Mr. MacCallan replied to some questions as to treatment.

Chemistry of Senile Cataract.

At the afternoon session Mr. J. Burdon-Cooper (Bath) read a paper on the physio-chemical changes occurring in the lens in senile cataract. He gave an account of the facts he had observed which led him to the conclusion that cataract was a hydrolysis of the lens. He distinguished between hydrolysis and hydration. After the examination of some hundreds of specimens he had satisfied himself that tyrosin was present in both lens and aqueous in every case of senile cataract. He then gave his reasons for concluding that tyrosin came from the lens; in some of the glycosuric cases cholesterin was present as well. As cholesterin was a monatomic alcohol, and tyrosin an acid, the same change (hydrolysis) would account for both. The occurrence of pigmentation in the lens was due to oxidation of tyrosin and not to infiltration of haematin. He had found no evidence in three cases of blood pigment spectroscopically. He then reviewed the older theories, which he found to be untenable and not in accordance with the facts.

Regeneration of the Cornea.

Professor Selzer read a paper on the regeneration of the cornea after wounds, and showed that the epithelium first became regenerated; the keratoblasts then pushed their way in, and were the precursors of the interstitial substance of the cornea.

Operations.

Professor Wicherkewicz (Cracow) described a new operation for the relief of ptosis. It somewhat resembled Panas's operation, but he took the whole breadth of the lid and slipped it beneath the bridge, which was made in a manner somewhat similar to the other well-known method.

Dr. J. M. West (Baltimore) described an operation for intranasal partial resection of the lacrymal sac is cases of dacryostenosis. The operation, which he had done 125 times, consisted of removing the inner wall of the lacrymal sac through the nose, and thus making a direct communication between the remains of the sac and the nose; consequently it was a matter of indifference if there were a stricture of the nasal duct or not. He thought that anyone who was able to do intranasal operations would be quite capable of doing this. In reply to some questions, he said that there were no complications afterwards, and that the drainage was so perfect that even a septic and suppurating sac quickly became quite normal.

Dr. Magitot (Paris) read a paper on keratoplasty, with a report of 4 cases in which he had had most gratifying results from the transplanting of the cornea in cases in which this structure was damaged or destroyed. In none of the cases did he remove the whole thickness of the cornea, and he always left Descemet's membrane on which to place the transplanted tissue.

Professor Greeff (Berlin) showed a new method of setting up eye preparations for museum purposes by means of which the colour of the retina and various parts was perfectly preserved.

Professor Stock (Jena) gave an account of the blood count in cases of tuberculosis in the posterior part of the eye.

DISCUSSION ON THE TREATMENT OF GLAUCOMA.

On Friday the proceedings commenced with the discussion on the treatment of glaucoma.

Professor Priestley Smith, by whom it was opened, reviewed the results obtained with the several operative measures which were in vogue for the treatment of this disease. The most famous name in connexion with this disease was, he said, von Graefe, and it was he who first pointed out the benefit of iridectomy, and until the last few years this was the operation done in practically all cases. It was a fact that some of the best results were obtained when for some reason or other a cystoid cicatrix developed, and it was often noted that the cases which healed well and gave a perfect surgical result were not the cases in which the tension was permanently relieved, and such eyes were often lost by a continuation of the disease. Even von Graefe saw the benefit of a permanent filtering cicatrix, but it was not easy to accomplish, and until recently it only came about when there was something entangled in the wound, such as a piece of iris. This was not always an unmixed advantage. The alternative operations had for their object the establishment of drainage, either by getting a piece of iris entangled, or by complicating the form of the wound so as to prevent its closing easily, or by excising a piece of tissue. The speaker had made extensive inquiries as to the practice of British ophthalmic surgeons, and from the replies he had received he found that a few months ago 80 per cent. adhered to iridectomy in acute glaucoma, but that 75 per cent. had given up iridectomy in cases of chronic primary glaucoma, while most of the surgeons spoke in favour of the trephine. The operation which had the next largest number of adherents was the trap-door operation of Herbert; the others preferred the method of

Lagrange. Trephining was rather apt to be followed by a quiet iritis, but this could be largely guarded against by the use of atropine, which had no bad effect on a glaucomatous eye after scleral trephining, nor, indeed, after an iridectomy, and he used it in all cases. He expressed his liking for the wedge operation of Herbert, though the inventor himself had abandoned it. Professor Lagrange (Bordeaux) went very fully into the method of doing the operation associated with his name; he was one of the first to advocate the necessity and the possibility of doing an operation for the establishment of a permanent filtering cicatrix. Colonel Elliot, I.M.S. (Madras), expressed his firm belief that trephining was by far the most certain, effectual, and safe way of bringing about permanent drainage in an eye. It gave the maximum surface area for drainage, and was less likely to be encroached upon during the healing process than any other method. No sharp instrument was pushed into the eyeball, and no tissue was cut to waste. The cornea should be split for from 1 to 2 mm., and a trephine 1½ mm. in diameter was amply large enough for all cases. The iris and disc should be removed together with a single snip of the scissors. Post-operative iritis was of no consequence, and was due to the leaking anterior chamber, but it could always be combated with atropine, which he used in all cases. He performed the operation in all varieties of glaucoma and thought it just as satisfactory in acute and subacute glaucoma as in the chronic variety. Dr. Weeks (New York) had done all sorts of operations, and he now thoroughly endorsed the claims made by Colonel Elliot. He found that a cystoid scar developed in all but some acute cases, and it was not nearly so important in these as in the chronic variety. Colonel Herbert (late I.M.S.) rather feared cutting out a piece of sclera in case it produced a too permanent softness of the eye. He argued in favour of the operation he had himself devised and which had a good many adherents. Mr. Arnold Lawson thought that in the future the Elliot operation would be that universally adopted for all chronic cases at least. It was safe and easy to do, and certain in its results in lowering the tension. He preferred a 2 mm. trephine for the reason that if the disc of sclerotic got adrift in the anterior chamber it might be removed through a hole of this size, which he failed to think would be possible through a smaller one. Mr. R. R. Cruise said he trephined in all cases, but in order to still further promote a large filtration area he advocated the introduction of a piece of silk thread beneath the conjunctival flap. Dr. Marple (New York) preferred a trephine of only 1 mm. in diameter, and found this quite large enough. He mentioned the fact that he used a small hook in order to prevent the disc being pushed into the anterior chamber, and the trephine worked round the hook, the handle of which passed through the trephine. Dr. Reeve (Toronto) thought the Elliot operation an excellent one; it could be done when no other operation was possible. Professor Sattler (Leipzig) thought that the inclusion of the iris in the wound was a very serious and undesirable thing, but he had had good results with the operation of Colonel Elliot. Professor Stock (Jena) had for the last four years practised the trephining operation. His results had been quite satisfactory, and the vision had improved even in some cases in which the tension had not been fully relieved. Professor Axenfeld thought that late infection was possible after the operation of trephining. Several surgeons, both English and foreign, proposed small modifications in the details of the operation, but it was the almost unanimous opinion that there was no operation anything like so efficient as trephining for chronic glaucoma. Many also did the operation in subacute cases, while Colonel Elliot and a few of his close followers thought it the best operation for the acute cases as well. On the other hand, by far the majority of surgeons preferred to do iridectomy in at least the acute cases. Colonel Elliot, in reply, said that if the disc of sclerotic were lost in the anterior chamber it should on no account be looked for, nor should any attempt be made to remove it, for it did no harm whatever to leave it where it was, and much harm might ensue from attempts to remove it. He had never come across a case in which septic infection had followed the operation as a late result, and if surgeons would wash out the conjunctival sac with mercury perchloride he did not believe that primary infection would ever take place. The work done by Colonels Elliot and Herbert, as well as by Lagrange and Freeland Fergus, was gratefully acknowledged by the whole Section, and it was considered that greater advance had been made in the treatment of glaucoma during the last five years than had taken place since the time of von Graefe. The discussion was a very prolonged one, and took up nearly the whole day.

Independent Papers.

The following independent papers were read: Professor Falchi (Pavia): Operation for secondary cataract combined with peripheral cystotomy. Dr. J. A. Ballantyne (Glasgow): Some observations of results obtained with the Schiotz tonometer. Dr. Magitot (Paris): On the rôle played by the cells of the vitreous in the formation of liquid in the anterior chamber of the fetus.

Operation for Contracted Orbit.

On Saturday Dr. G. A. Berry, Vice-President, took the chair for the President, Sir Anderson Critchett. The proceedings were opened by a demonstration of an operation by Dr. J. E. Weeks (New York) for the restoration of the cul-de-sac in cases of contracted orbit. He spoke of the difficulties of transplanting skin so as to increase the area of the conjunctival sac, and pointed out various circumstances which had led to failure in the attempts made in this direction. He then described and demonstrated the operation he had devised for this purpose. The tissues were first dissected up and a raw surface produced. Then a skin flap was cut from the arm of the patient rather larger than the surface to be covered, and all the adherent subcutaneous tissue was carefully removed with scissors. The flap was then folded on itself, with the epithelial surfaces touching, and three double-threaded sutures were passed through the flap at the situation of the fold. The needles were then passed through the periosteal tissue at the orbital margin, and the graft was drawn into position. The sutures were then tied on the face or forehead over pieces of lint. The flap was made to fit exactly; if too large, its edges were trimmed with scissors. It was very important to have the flap large enough so that no stretching of it with the sutures was necessary. Finally, the edges of the flap were fastened to the surrounding tissue with interrupted sutures. The graft usually took well, and the stitches were removed about the tenth day. Previous to this a rubber plate was made and accurately moulded, so as to keep the fornix well marked, and this plate or an artificial eye had to be worn until all shrinking had disappeared. The results in his cases were most satisfactory. He had operated on 19 patients, and in these he had restored the cul-de-sac in the upper or lower lid, or in both 29 times, and all but one gave most gratifying results. Dr. Marple (New York) said that he had followed Dr. Weeks's directions, and could speak of the excellent results he had obtained. Colonel Elliot asked why the Thiersch graft had been abandoned, while Mr. Bishop Harman thought that the skin of the prepuce would be far more satisfactory, as it was devoid of hairs. Dr. Weeks said that it would be extremely difficult to get Thiersch grafts anything like large enough, and if several had to be used it would be very inconvenient; he had never had any difficulty with the hair which grew on the flap, and they were easily removed with scissors if they became troublesome. It would be impossible to get anything like enough mucous membrane from the lip to utilize as a graft as was suggested by one speaker. The operation took about an hour or a little more to perform.

Etiology of Parinaud's Conjunctivitis.

Dr. de Schweinitz (Philadelphia) read a paper on behalf of Dr. Verhoeff of Boston, who was unable to be present. Dr. Verhoeff had been investigating cases of Parinaud's conjunctivitis, and had discovered a micro-organism in 11 out of 12 cases. It was small and filamentous, and owing to the position in which it was found, and to the fact that it was not found elsewhere, he had come to the conclusion that it was the cause of the disease, but he had not completed his investigations, for he had not cultivated it nor had he performed inoculation experiments. Until these were carried out it was impossible to be certain whether it was the true organism or not, but he thought the

evidence strongly in favour of its being the re cause o the disease. Professor Mollers (Berlin) discussed the bacteriology of the disease, and thought that the organisms might be found eventually to be tubercle which had assumed this form. Professor Axenfeld, who also had examined the specimens, said that the exact nature of the organism still remained to be proved, and without cultures and inoculation experiments it was impossible to make sure about it. Filamentary characters had been seen in both tubercle and diphtheria bacilli.

THE PECTINATE LIGAMENT.

Dr. Leslie Buchanan (Glasgow) said that for a long time he had doubted the usual teaching that Descemet's membrane broke up at the periphery of the cornea and gave rise to the fibres of the pectinate ligament. After examining some carefully prepared specimens of a normal human eye he became satisfied that Descemet's membrane really ended comparatively abruptly at some little distance from the true angle of the anterior chamber, and also that it took no part in the formation of the pectinate ligament. On further investigation it became more and more clear that the radial portion of the ciliary muscle gave rise to a series of fibres which were functionally a tendon, and these fibres formed a large portion of the tissue which was called the pectinate ligament. Other sections showed that fibres did pass from the ciliary body to intermingle with others of corneal origin, and that the spaces of Fontana were the result of the interdigitation so formed. There was one other constituent part of the ligament which required notice, and that was the portion which was derived from the iris. This band was thin, it formed the anterior root, and served to convey the lining epithelium of the anterior chamber from the iris to the cornea. This bundle of tissue passed across behind the canal of Schlemm and lost itself in the cornea in front of Descemet's membrane. He then examined the condition in the monkey (*Macacus radiatus*), and found that a very similar state of things existed there. Similar conditions were found also in the dog, sheep, and ox. Mr. Greeves said he thought that Descemet's membrane was represented in the fibres of the pectinate ligament.

DEMONSTRATIONS.

Goggles.

Professor Stock (Jena) showed a new form of protecting goggles. The chief characteristics of them were that the dark glass of which they were made was curved in the shape of a deep dome, while the bridge was hinged so as to adapt them to any shaped face, and thus to afford far greater protection than the usual patterns which certainly did not protect the eyes sufficiently from either light or dust.

Mr. R. A. Greeves (London) gave a demonstration of Russell's hyaline bodies in the ocular tissues. These bodies were at one time thought to be cancer bodies, but it was now generally known that they might be found in any tissue suffering from chronic inflammation. They were found but rarely in the retina though frequently in the iris, ciliary body, and choroid, and also in trachoma. They were insoluble in ether or alcohol and so could not be of a fatty nature, nor did they give the amyloid reaction. He showed some slides of tissues containing them.

Dr. Maitland Ramsay (Glasgow) showed in the epidiascope a beautiful series of coloured photographs of patients with typical external eye diseases. They were taken by means of the new process of colour photography, and they showed in the most perfect way the appearance of the patients. He remarked that little progress had been made until it was found that the flashlight was the correct source of illumination for this purpose. If even bright daylight were employed the exposure had to be so long that it greatly complicated matters.

Dr. Mackay (Edinburgh) showed also in the epidiascope a number of water-colour drawings painted by an artist in Edinburgh, depicting external diseases of the eye.

Dr. Marple (New York) gave a demonstration of his electric self-illuminating ophthalmoscope. He pointed out that there were a considerable number of instruments on the market which were supposed to be his own, but which were really such bad imitations that he was himself utterly unable to use them. He pointed out that an electric ophthalmoscope must be one that was really adapted to this purpose, and that those which had an electric attachment which could be put on or taken off were useless. He looked upon the U-shaped mirror as essential; in it was a slit in which the glass was removed entirely and not the silvering only. The mirror was strongly concave, and it was essential that the electric lamp should be made to move nearer or farther away from the mirror as required. Dr. Fenton (Philadelphia) described an electric ophthalmescope he had devised, and which he thought an improvement on the other instruments. Colonel Elliot spoke of the Marple-Morton instrument in the highest terms. Mr. Leslie Paton (London) had found the instrument most useful, but he did not think it as good for measuring the height of swellings in the fundus as the ordinary one. Dr. Marple, in reply, said there was no difficulty about this, and mentioned that Messrs. Meyrowitz were the only makers of the instrument whom he trusted.

DISEASES OF CHILDREN.

THE President, Dr. Eustace Smith, opened the work of the Section on Thursday by a short address. After extending a welcome to the visitors he referred to the special characters of diseases as they occurred in children, and traced the growth of paediatrics as a special subject. He concluded by expressing a hope that the new method which had been introduced would not lead to a neglect of those older methods which had already been proved useful.

TUBERCULOSIS.

Surgical Treatment of Tuberculosis.

The special discussion of the day—on the treatment of tuberculosis in childhood from the surgical point of view, with special reference to bones, joints, and glands—was introduced by Dr. V. Ménard (Berck-sur-Mer). From the standpoint of local treatment, tuberculous osteitis, he said, should be separated from tuberculous disease affecting both bones and joints. The local treatment indicated in arthritis was the conservative method, which was almost always efficient if persisted and persevered in. The most successful operative treatment could not replace conservative treatment. Surgical interference was required in suppuration as the result of associated and accidental infections, and when the disease affected particular joints. Operation removed an obstacle to local recovery. Such an operation was drainage, or a form of resection, which was really drainage on a large scale. The fatality of operative procedure was very small except in the case of hip-joint disease, but here it formed no contraindication, for it was necessary to save life. The results of operation were good if the after-care was rational and persevering. In spite of the improvement of medical treatment in glandular disease, there still remained a part for surgery to play in this condition to free the patient quickly from large masses of glands. Whether operated upon or not, the patient could only recover if placed under favourable conditions for a long time. Mr. Harold J. Stiles (Edinburgh) presented a report on treatment of tuberculosis in childhood from the surgical point of view, with special reference to the bones, joints, and glands, and made the remarks on prophylaxis and the recent work in Edinburgh in this direction which are printed at p. 370. In concluding his remarks, Mr. Stiles said that tuberculosis of the lungs in adults was usually the result of infection through the respiratory tract, whilst in children tuberculous infection was usually through the alimentary tract. It was very important that the milk used for the artificial feeding of infants should be sterilized, unless it could be guaranteed free from tubercle bacilli, and that sterilization should be employed also in all households where the children drink milk. Amongst those who took part in the discussion which followed were Professor von Pirquet, Professor Tedeschi, Dr. Andrieux, Dr. Comby, Dr. d'Oelsnitz, Dr. Treplin, Dr. Binney, Dr. Koplik, and Dr. Nordheim.

Diagnosis of Early Pulmonary Tuberculosis.

In the afternoon Dr. David Lees (London) dealt with the diagnosis of early pulmonary tuberculosis in children. He emphasized the value of careful methods of percussion, pointing out that such examination was all the more

important in children, since, as a rule, no sputum was obtainable. He contended that the areas of early invasion of the lungs could be delimited by proper percussion, and by the same method a record of the improvement or otherwise of the disease could be kept. He indicated the areas where early tuberculosis was to be expected. Accurate and careful percussion was capable of leading to the detection of the disease before it could be detected by any other means. Dr. P. van Pée, of Verviers, spoke of the value of "orthopercussion," as described by Goldscheider and by Curschmann and Schlayer. It was based on the following principles: (1) The percussion should be as gentle as possible, so that the sound could only just be heard; (2) as small an area as possible should be percussed by application to the chest, not of the terminal phalanx but of the end of the finger, placed vertically in the position of Plesch; (3) percussion should be made with the pleximeter finger parallel with the mid-line of the body. He examined symmetrically the following regions: (*a*) The area between the two sites of insertion of the sterno-mastoid muscle; (*b*) the supraclavicular triangle; (*c*) the area outside the subclavicular region; (*d*) the area of the manubrium sterni and the sterno-clavicular articulations. The diagnosis of pulmonary tuberculosis in the newly-born was always difficult, and as it had always been shown that the tuberculin tests gave a positive result more frequently as age advanced, the difficulty became worse. Seeing the frequency of a positive reaction to the bacterial test, it was important to give to ordinary clinical methods the credit which was their due. Dr. d'Oelsnitz (Nice) spoke of the diagnosis of the thorax by means of radiography. In the discussion which followed these papers Dr. Lapage (Manchester) supported Dr. Lees's contention as to the value of *x* rays in the early diagnosis of tuberculosis in children. He thought that the earliest signs were to be found at the roots and not at the apices.

Portal of Entry of Tubercle Bacilli.

Dr. Findlay (Glasgow) read a paper on the portal of entry of tubercle bacilli. He had, by means of special technique, been able to inject bacilli into the stomach without insufflating the lungs. The difficulty in avoiding this had rendered much former work valueless. The results of his experiments went to show that infection did not occur through the intestine in the absence of a local lesion.

Viability of Hand-fed Infants.

Dr. Coit (Newark, U.S.A.), in a paper dealing with the viability of children deprived of women's milk during the first year of life, spoke of the need of some means of estimating the value of different means of saving infant life at this period. Collaboration between scientific workers and social or philanthrophic workers was necessary. He exhibited "score cards" which he had found useful as indicators of the value of philanthropic and other measures.

THE CEREBRAL CORTEX IN CHILDREN.

Dr. Krasnogorski (St. Petersburg) concluded the day's proceedings with a paper on the fundamental mechanisms of the activity of the cerebral cortex in children. He thought that the activity of the cerebral hemispheres in children was founded on the following five fundamental mechanisms of the cortex: (1) The mechanism of contemporaneous interdependence—(*a*) the mechanism of conditional reflexes, (*b*) the mechanism of specific conditional reflex traces, (*c*) the mechanism of the speech reflex; (2) the mechanism of analysators; (3) the mechanism of inhibition; (4) the mechanism of contra-inhibition; and (5) the mechanism of positive and negative charge and discharge. With the help of motor conditional reflexes it was not only possible to follow the entire development and gradual increase in complexity of cortical activity in childhood from the first few weeks of life, but it was also possible to recognize even in the first few months of life the characteristics and defects in functions of the cerebral cortex, and to apply as soon as possible the proper therapeutic measures.

INFLUENCE OF THE DUCTLESS GLANDS ON DEVELOPMENT.

On Saturday morning the business began by a paper by Mr. Hastings Gilford (Reading) on the influence of the ductless glands upon development. He said that no one who attempted to assimilate the information upon the ductless glands which had been collected by Sajous, by Swale Vincent, by Biedl or by Cushing, or who went to the sources of their supply, could fail to be struck by the growing importance of the subject. At the same time it became evident that this information could not, as yet, be brought to a focus. Two kinds of research were being conducted upon the subject—one clinical and pathological, the other experimental. The former was scanty, but eminently suggestive; the latter copious, ingenious, and interesting. Experiment had led to the discovery of the hormones, had thrown light upon the nature of the changes wrought by the deficiency of secretions, and had furnished some valuable pharmacological agents. However, information as to the uses of the ductless glands must still be gathered mainly from clinical, surgical, and *post-mortem* study. The subject was one of correlation, but not so much correlation itself as of the excitement or depression of correlation. In all probability it was the mere mechanical penetration of the germ cell by the sperm cell which was the stimulus for the first correlation in all vertebrates, the fusion of sperm with germ afterwards supplying that blend of characters which constituted complete fertilization. Next there came a period of development in which, as yet, there were no ductless glands, when, as in plants, the necessary stimulus to correlation was both simple and direct. For a time there must exist in the primitive embryo some simple secretive mechanism which later on would be gradually segregated into organs and become ductless glands devoted to the production of hormones to excite and harmonize the action of widely separated organs. It might be suggested that this primitive faculty of cells was never lost, and that in after-life the ductless glands did not monopolize the power of chemical stimuli to correlation, but that all tissues possessed some degree of the same property. It might be in some such way as this that local correlations could be explained. Thus when a segment of a long bone was destroyed in infancy, the growth of muscle, fat, vessels, nerves and skin did not continue as on the sound limb. On the contrary, a considerable degree of adjustment took place. Such correlation was not solely the outcome of disease, for a similar process was at work in the limbs of the rickety and the achondroplasic. Local adjustments of this sort varied greatly in their completeness. It was true that achondroplasia was one of the disorders which had been attributed to deficiency of pituitary secretion, but, on the other hand, the locality and nature of the changes seemed to point to the skeleton as the prime seat of the disease. Another disorder which appeared to point to correlating influences, apart from ductless glands, was microcephaly. He said that the object which he had before him was to emphasize the doctrine first brought forward by Bernard, that although the ductless glands served an important purpose in the correlations of the body, they were only a part of the machinery of adjustment. For rapid adjustments the nervous system came into play, and for slower one had to consider not only the ductless glands but also that primitive capacity for adjustment which was inherent in the tissues of all parts of the body. Speaking of the *disorders* of the ductless glands, he said that out of the fog which at present obscured the subject a few clinical types of disease, the outcome of pathological changes in the ductless glands, were gradually emerging. They were as yet very ill defined, owing partly to overlapping of their symptoms, partly to the variability of the effects produced by similar lesions, and possibly partly to the influence of such other factors as he had just referred to. Yet there was some hope that they were on the right tack for the solution of the problem. It was right that they should co-ordinate their knowledge and formulate their theories, even though they were conscious that both knowledge and theories were fallacious. He then considered abnormalities of the function of the thyroid gland, pointing out that though myxoedema was regarded as hypothyroidism and Graves's disease as hyperthyroidism, the one was by no means an antithesis of the other. Speaking of the lymphatic system, he said that when lymphatic structures were overgrown the condition known as lymphatism was present. An infant in such a state in its most characteristic

form was fat, pale, and stolid, though the intake of food might be under the average. Lymphatic tissue apparently inhibited to some degree the action of the thyroid, the pars anterior of the pituitary gland, and the sex organs. Destruction of the large tracts of the lymph system, as in Hodgkin's disease, gave rise to a syndrome, in which emaciation and debility were conspicuous. Speaking of the sexual system, he stated that all attempts to influence growth and development by extracts from the sex glands had failed. They were not in a position to conclude that the series of changes which took place at puberty was solely the result of the pouring out of secretion from the sex glands, nor were they justified in assuming that the changes at the menopause were solely due to its withdrawal. He afterwards dealt with the pituitary system, stating that among the disorders attributed to defective action of the hypophysis were ateleiosis and progeria. He also considered the sexual group of diseases and those of the suprarenal system. He concluded by saying that for the answer to the question as to the causes of the defective or the excessive action of any ductless gland one must go to genetics. This branch of biology showed that as there was a normal size and a normal action, so also was it as inevitable as light to darkness that size and function must occasionally become abnormal and fall into extremes. By studying these extremes one arrived at some sort of conclusion, however hazy, as to the normal action of the ductless glands. In the harmony which was produced by the concerted action of the ductless glands there was reason to suppose that the leading part was played by the thyroid. This supplied a stimulus for the metabolism of the body as a whole. During infancy and childhood the influence of the thyroid was checked by the thymus gland, by the lymphatic system, and perhaps by the pineal gland. These also brought about that delay of sexual activity which was so essential to the proper maturation and stability of the somatic faculties. Probably the first to break through this cordon of conservative influences were the adrenal glands, which awakened the dormant sexual organs and hastened the growth of the muscular and skeletal systems. At about the same time the skeletal system was still further stimulated by secretions from the pituitary gland. This secretion hastened the development of every organ in the body, including the sex organs. These latter now ripened apace, and, assisted by the combined action of the ductless glands, sometimes animating at others restraining, carried the development of the body in waves and tides to its flood.

Suprarenal Inadequacy.

Dr. d'Oelsnitz (Nice) contributed a paper on chronic suprarenal inadequacy in infants, which was followed by a discussion, in the course of which Dr. Koplik (New York) said that he had been impressed by the associated disturbances of the viscera generally in abnormalities of ductless glands. In children the intestine was almost invariably disordered. Professor Swale Vincent thought that much more was being taught about internal secretion than was really known. The difficulties were enormous. Extirpation of the thyroid never produced myxoedema. The pathology of myxoedema, or cretinism, was something more than merely thyroid insufficiency. Dr. Leonard Guthrie said that a distinction must be drawn between the obesity of Fröhlich's syndrome and that of hypernephroma. In the former the appearance was that of infantilism, the latter that of fat adults.

Septic Cases of Scarlet Fever.

Dr. Fischer (New York), in a paper on the treatment of septic cases of scarlet fever by neo-salvarsan, said that he had treated 10 apparently hopeless cases in this way, of whom 3 recovered. He thought the method was worthy of trial in cases where nothing else could be done.

Visits to Institutions.

On Friday afternoon members of the Section met at the Hospital for Sick Children, Great Ormond Street, where they were shown a number of clinical cases of unusual interest by members of the staff.

On Saturday afternoon the members of the Section visited Lord Mayor Treloar Cripples' Home at Alton.

MORTALITY IN THE FIRST MONTH OF LIFE.

On Friday, August 8th, a joint session of the three Sections of Obstetrics and Gynaecology, of Paediatrics, and of Hygiene and Preventive Medicine, was held to discuss the important question of infant mortality in the first four weeks of life. Dr. Arthur Newsholme, President of the Section of Hygiene and Preventive Medicine, took the chair, and was supported by Sir Francis H. Champneys, President of the Section of Obstetrics and Gynaecology. Dr. Newsholme opened the proceedings by a few well-chosen remarks, in which he referred to the considerable variation of the death-rate in infants in different localities—a variation that could not easily be explained. To elucidate this difficulty collaboration was necessary between those working at public health, those working at obstetric medicine, and those at diseases of children. The decline in mortality during the last ten years was very great, but was less during the first month of life. Even at this period there had been as much as a 10 per cent. decrease. He did not accept the opinion that the death-rate during the first month of life could not be further reduced. Dr. H. K. Chalmers (Glasgow), in presenting the first report, said that the factor which dominated the mortality curve for the whole of the first year of life was the number of deaths in the first month. At this period death might be due to an inborn physiological inability to live rather than to acquired diseases affecting previously healthy infants. Many could be described literally as children born to die. One of the important questions to be answered was whether this was due to the conditions under which the mother lived or to disease of which she might be the subject. Statistics appeared to show that the urban infants were nearly as healthy at birth as those born in rural districts, and the mortality in the first month was the same under both conditions. Statistics by which the causes of death at this period could be estimated were unsatisfactory, and the only figures available were those from comparatively small districts. A considerable diversity of terms was used to describe the same cause of death. He suggested "immaturity" as the best term to cover all the conditions of post-natal fatality not due to acquired diseases. Deaths certified as due to "premature birth" had increased disproportionately during the last ten years. Still-births appeared to be more common at the beginning and again at the end of the child-bearing period. He had a record showing that no fewer than 1,500 stillbirths occurred in about 500 mothers; they were slightly more frequent in "working" mothers, using the word "working" in the meaning of the Factory Act. Dr. Henry Koplik (New York), who followed, said that infant mortality in the first four weeks of life was so intimately connected with prenatal influences that this month of extra-uterine existence might be considered as closely allied in many of its aspects to the history of the fetus *in utero* and just before birth. There were many conditions of both the father and mother which resulted in the production of an infant unfitted to resist the physical influences of post-natal existence. Present methods of preservation of the life of the newborn did not reach this set of cases. Perhaps this was fortunate, as certain mothers suffering from organic disease, syphilis, tuberculosis, heart disease, diabetes, and nutritional disorders, brought into the world infants who were either premature or unfitted to live. The effect of some weaknesses of the mother could be understood, but the influences of the father in causing weaknesses of the newborn were often not clear. In considering the whole subject special attention should be directed to certain definite ills of infants. First, the infant born prematurely and congenitally weak, but free from constitutional disease such as syphilis. Secondly, the infant apparently free from disease, but too weak to live—those below a definite standard living weight. This class must also include all stillbirths, without accidental birth complications. Thirdly, stillbirths, as the result of accidents in delivery or instrumental interference. Fourthly, infants born of good weight, viable, and free from constitutional disease, who died subsequently the victims of some acquired infection, or condition or inanition. Fifthly, infants born prematurely, of good weight and viable, the subjects of constitutional disease. Speaking of the first class of infants, he said that of those born weighing less than 1,500 grams, only

1.9 per cent. survived, and there was a gross mortality of 98 per cent. for all premature infants born 1,000 to 2,000 grams in weight. On the other hand, fully 77 per cent. of the infants born in Budin's institution whose temperatures and strengths were conserved, and who weighed 2,000 grams or less, survived. This illustrated the potent influences of exposure on the premature. Leaving aside the influence of syphilis and constitutional disease, it might be said that the premature infant would survive or succumb, according to whether the body temperature was conserved, whether it escaped infection, and lastly, whether it was placed in a position to have artificial or breast feeding. Among prematurely born infants fed on the breast there was a mortality of 15 per cent., whilst among those who were bottle-fed it amounted to 41 per cent. Stillbirths in Germany in 1906 numbered 62,261 in 2,084,738 births, 3 per cent. of all births, and 6 per cent. of all deaths in round numbers. In New York the statistics for the years 1911–12 showed that there were 5 per cent. of stillbirths. Advances made in the care of the parturient woman had reduced the dangers of infection of the newborn considerably, but malformation and constitutional disease would still remain as prevalent as they had been for many decades past. The morbidity among the newborn was of great interest. First it was noticeable that among breast-fed infants the mortality was not as high as among the bottle-fed. Hence, though morbidity might be as common, the resistance to the inroads of disease was much more successful among the breast-fed. Again, 28 per cent. of the deaths occurred in the first month of life. Of all these only 7 per cent. were in breast-fed children. Moreover, in the height of summer the deaths of bottle-fed infants outnumbered the breast-fed by 41 per cent. This proved distinctly that the dangers which threatened the artificially fed infant—poverty, heat, ignorance, crowding, unskilful feeding, and decomposed food—did not apply to breast-fed infants in the same degree as to the bottle-fed. Social position was another important element in infant mortality, but it affected the breast-fed infants very little. The number of children in each family among the very poor also influenced the death-rate. The question of legitimacy and illegitimacy was a potent factor not only as to morbidity but also as to mortality. There were no statistics obtainable in the United States which gave an idea of the mortality in the first four weeks of life unless computed by special request. He had compiled these statistics from the Board of Health records of the City of New York, inspecting every death certificate for this purpose; 4.1 per cent. of all children born died in the first four weeks of life, or about 1 in every 25. Of all children who died in the first year, 33.2 per cent. died in the first month. The largest number of deaths occurred in premature and congenitally weak infants, and accounted for half of the total deaths. The next greatest cause of death was injury at birth or sepsis with umbilical haemorrhage. Analysing still further, it was found that the greatest number of weaklings died during the hot months. Syphilis accounted for only a few deaths—47 in a total of 2,732. The measures which would go a long way towards the prevention of prematurity would be those which furthered the strength as well as the health of the mother. It could be proved that if the mother was given rest, good food, and quiet surroundings the product of pregnancy would benefit. There was a movement in America to give more and more attention to the antenatal aspect of infant mortality by the establishment of retreats for pregnant women. Good food, good surroundings, and teaching as to the duties of motherhood to those who were to see their first-born, would do much to reduce the mortality. He believed that artificial feeding at the hands of a well-taught mother or nurse was preferable to a wet-nurse from a social standpoint. The third report was presented by Dr. Wallich of Paris. He dealt with the subject under four heads: (1) The degree of mortality in the first month; (2) the causes of mortality in the first month; (3) the remedies; and (4) his conclusions. Of 4,833 deaths in the first month, 571 died before the fourth day, 297 from the fifth to the ninth day, 401 from the tenth to the nineteenth day, and 239 from the twentieth to the twenty-ninth day. It appeared that the mortality in the first month was considerably greater than in the other months of the first year, varying from a quarter to even a half of the total mortality. The number of deaths was greatest in the first and third weeks. Among the causes of death, prematurity was by far the most important, next injuries at birth, next gastro-intestinal disorder. Even where the causes of death were due to injury at birth or to disease, prematurity played a predominant part. He also emphasized the evil influence of the separation of the child from its mother. Speaking of treatment, he said that that which was applied to difficulties at birth and acquired disease was well known, and it was now of the greatest moment to combat the social causes of infant mortality.

A spirited discussion followed, in which a large number of speakers took part. Sir Francis Champneys said that in England the interest of the State had only just been excited. The first important thing to do was to try to make it fashionable for mothers to nurse their babies. A very common mistake was to feed the baby from birth upon cow's milk; another to feed it when it cried from thirst and not from hunger, when water should be given. He thought that money spent by the State in teaching mothers how to look after their children would be repaid fourfold. Dr. Amand Routh (London) urged the necessity of the routine examination of all pregnant women, and of establishing prematernity wards into which all expectant mothers in whom there was any suspicion of disease or abnormality could be admitted and delivered under the safest conditions. He advocated the notification of stillbirths. Sir John Byers (Belfast) said that the aim of the profession should be to ensure pure milk rather than to advocate its sterilization. Every precaution was taken to obtain a pure supply of water, but milk was very inadequately safeguarded. Dr. Eric Pritchard (London) said that much of the mortality was due to unnecessary weaning during the first few weeks of life. Children were often taken off the breast even at the end of the first week on the plea that the breast milk was insufficient, without any investigation having been made, and in spite of the fact that in many cases the breast milk was not secreted until the end of the second week. Infection occurred through denuded mucous membranes due to faulty nursing and feeding with cow's milk from the beginning of life.

NEURO-PATHOLOGY.

THE fact that the Section commenced its proceedings on Wednesday showed that its members were in for a strenuous week. If the attendance at the opening meeting is to be any criterion of what is to follow, the success of this Section is assured. And one has but to scan the list of names of those who are down to read papers to know that the latest and most original developments of this comparatively youthful branch of medicine will be discussed by the master minds of the subject. Among the distinguished visitors present at the opening meeting were Babinski, of the famous La Pitié Hospital of Paris, Nonne of Hamburg, Monakow of Berne, Rossolimo of St. Petersburg, Donath and Jendrassik of Budapest. The President (Sir David Ferrier) in his very felicitous opening address, while offering a cordial welcome to the visitors of every clinic and country represented, made fitting reference to the absence, through death or illness, of several whose names are household words in neuro-pathology—mentioning more especially the late Dr. Hughlings Jackson, and Sir William Gowers, who was not well enough to attend. The Section had now obtained a position in some degree commensurate with the importance of its work, and although some might take exception to the separation of neuro-pathology from psychiatry, as narrowing its outlook, there was much to be said for the division of labour. He quoted the late Sir James Paget as saying that in "science as in mining, a very narrow shaft, if it be carried deep enough, may reach the richest stores of gold," and recalled the fact that when the Conference last met in London the question of cerebral localization was still under discussion. The study had travelled far since those days, and the principle of cerebral localization had now been universally accepted. Due reference was made to the myelinization method of Flechsig, and the cyto-architectonic researches of Campbell, Brodmann, Bolton, and others, which had helped to show that the cortex cerebri, instead of being uniform in development and structure, was capable of differentiation into a multi-

tude of areas more or less sharply marked off from each other, and each possessing its own distinctive characters. That these differences in development and structure were correlated with different powers of functional activity seemed to be beyond all reasonable doubt. Reluctantly, however, the President had to confess that much of the cerebral cortex was still a functional *terra incognita*, and the function of many of the fifty areas differentiated by Brodmann could not even be surmised. The localization of simple mental processes involving cognition and volition was still as far away as ever. Neuro-pathologists did not believe in the localization of faculties in the sense of the phrenologists, nor did they think that intelligence as such had a local habitation in any particular part of the brain. The brain as a whole was the substratum of intelligence, but this was not one and indivisible any more than the cortex was everywhere the same. The brain, in fact, was a structural and functional mosaic. In his concluding remarks the President pointed out how much neuro-pathology owed to clinical and pathological research, and paid tribute to the work of Dr. Head in the different forms of sensibility and their appreciation. Neuro-pathology, like so many other branches of medical science, had recently been powerfully influenced by bacteriology and bio-chemistry, and developments in this direction were only commencing. Several short papers were afterwards read.

Cerebellar Disease.

Sir David Ferrier was again in the presidential chair on Thursday morning, when Dr. Babinski, senior physician to the Pitié Hospital in Paris, opened the discussion on the symptoms of diseases of the cerebellum and their significance. He spoke with great rapidity and in the space of fifteen minutes covered an amazing amount of ground. He was listened to with rapt attention by an audience which filled every nook and cranny of the large Botanical Theatre of the Royal School of Science. Following some introductory remarks in which he pointed out that one of the principal obstacles in the way of the study of cerebellar disease lay in the anatomical and functional relation which united the cerebellum and the labyrinth, Babinski divided his consideration of the subject into three main parts: (1) The cerebellar syndrome; (2) the study of symptoms rarely met with; (3) a discussion of the conditions which vary cerebellar symptoms or explain their attenuation, persistence, or aggravation. In the first part he gave an historical survey of experimental work on the subject from Flourens and Magendie onwards, and in the second part of his communication he dealt with cerebellar asynergia, and described several phenomena which in his opinion might be included under this title. Under this division also fell the symptoms he had described as adiadocokinesis, asthenia, cerebellar ataxia, and catalepsy, whilst in the third part he dealt with the localization of these symptoms.

Dr. Rothmann (Berlin), who followed, after sketching the new anatomical division of the cerebellar lobes and the microscopic structure of the cerebellar elements, discussed the different theories of the function of the cerebellum as a whole, and showed how impossible it was to bring the cerebellum into the formula of a single function. Starting from Boch's researches in comparative anatomy, he enunciated the doctrine of cerebellar localization as it has developed from the basis of experimental observations on dogs and apes. According to this, there exist centres in the cerebellar hemispheres for the regulation of movement of the unilateral fore and hind limb. In the middle of the cerebellum lie co-ordinated centres for the back and limbs, and in the anterior lobe centres for the innervation of the neck muscles, the jaw, and larynx. Within the limb regions a further localization was recognizable according to the direction of movement. Loss of equilibrium and tottering movements appeared only after destruction of the cerebellar nuclei. In man, where the compensating power of the cerebrum is greater, the pathological material available rendered the recognition of a finer localization difficult. After eliminating the general symptoms and the influence on neighbouring nervous areas, marked disorders of vision and gait, as well as Babinski's "*asynergie cérébelleuse*," were classed as middle-lobe symptoms. To these were to be added disorders of innervation of the head and voice. Adiadocokinesis (Babinski) was beyond doubt a cortical symptom. Above all, the symptoms described by Bárány—irregular movements of the limbs and joints in various directions during attempts at pointing—proved the existence of a regular localization in the cerebellar cortex of man. The connexion of the cerebellum with the vestibular apparatus was specially brought out by Bárány's researches on caloric nystagmus. Severe disturbances of equilibrium, spasmodic conditions, and certain ocular phenomena were connected with affections of the cerebellar nuclei. Rothmann's communication was illustrated by a wealth of original diagrams, and his remarks were punctuated by murmurs of appreciation from time to time, and finally by a regular salvo of applause. Dr. Gordon Holmes then gave an account of his clinical observations in a number of cases of cerebellar disease, and was followed by Bárány, who gave a practical demonstration of his method of vestibular stimulation. So interested did the professor and his audience become in these experiments that he had to be allowed an extension of time by the President—a concession of which he was not slow to avail himself. Then followed Anton, Bruns of Hanover, Nonne of Hamburg, Obersteimer, and Auerbach. After the clashing of swords of these experts it was a not unwelcome sound to hear the Anglo-Saxon tongue again when Dr. Allen Starr (America) entered the lists. He had noticed one curious symptom in cases of cerebellar disease. It was a sudden giving way of the limbs and falling of the patient in the most unexpected manner. He quoted several cases which showed this symptom. Dr. Risien Russell also took part in this most interesting and valuable discussion.

OTOLOGY.

The Section was opened on Wednesday afternoon by the President, Mr. Arthur Cheatle, who, in a brief address, after welcoming the visitors, reviewed the work that had been done in otology since the Congress met in London in 1881. Tuberculosis and syphilis of the ear had, he said, been investigated, the temporal bone had been searched and described with all its variations and possibilities, a great deal of preventive treatment had been undertaken, more particularly by the examination and treatment of school children. Many of the operations for the saving of life and the preservation of hearing had been evolved during the past thirty years.

Professor M. J. Mouret of Montpellier read a paper on the surgical mastoid. The author described in detail the region in which the surgeon had to work in the course of a mastoid operation. He entered into the development, the connexions, and the relations of the antrum and the air cells of the mastoid. The paper was supplemented by twenty-two illustrations. He concluded by drawing a comparison between the retro-meatal and the transpino-meatal operation, which he advocated.

Professor P. Jacques of Nancy contributed a paper on the pharyngeal drainage of an otogenous abscess.

Professor Holger Mygind (Copenhagen) read a paper entitled "Secondary suture after simple resection of the mastoid process." He dealt with the many drawbacks attached to the ordinary after-treatment of cases of simple resection of the mastoid process for acute osteitis by the filling up of the osseous cavity with granulations. The chief of these drawbacks was that the healing process was lengthy, taking generally from six to twelve weeks; moreover, the frequent changing of the dressings, especially when the patients were children, was often troublesome. Professor Mygind described in detail his method of performing the secondary suture, and stated that by this means he had been able to shorten the average period of seventy-four days required in his experience at the Copenhagen Commune Hospital to only twenty days, in which time the cases healed, practically speaking, *per primam*. The paper was discussed by Professor Moure (Bordeaux), Professor Kubo (Japan), Dr. Gorham Bacon (New York), Dr. J. F. Jack (Boston), Professor Gustav Alexander (Vienna), Professor Gherardo Ferreri (Rome), and Professor Denker (Halle). Professor Mygind, in his reply, expressed the opinion that children were perhaps better disciplined in Germany and Austria than in Copenhagen, where at times they had the greatest difficulty in repeatedly doing the dressings which the method he had described was the means of overcoming.

Dr. Louis Bar (Nice) read a paper entitled "Osteo-myélite du Rocher." A letter was read from Professor Politzer expressing regret at his inability to attend the Congress, and wishing the Section a great scientific success.

STOMATOLOGY.

PYORRHOEA ALVEOLARIS.

At the second meeting of this section, on Thursday morning, Dr. Znamensky (Moscow), in opening a discussion on the pathology and treatment of periodontal disease (pyorrhoea alveolaris), described the conditions found in a series of sections of a jaw affected by pyorrhoea. The bone was destroyed by a process of rarefying osteitis. It was first transformed into a connective tissue which became absorbed. The disease might be due to local conditions, to general diseases such as osteo-malacia, syphilis, and rickets. When the bone forming the sockets of the teeth was destroyed, pockets were formed which became infected with pyogenic organisms, and a flow of pus ensued. In slight cases of pyorrhoea, when the rarefaction was limited to a part of the bone not containing bone marrow, the removal of tartar, and the use of disinfectants and astringent washes would bring about a cure. When the pockets were deep and the part of the bone containing bone marrow was affected, the pocket must be thoroughly curetted. When more than two-thirds of the socket was destroyed and constitutional diseases such as tabes dorsalis or diabetes were present, curetting was contraindicated as unlikely to do any good. Mr. E. B. Dowsett (London) believed that pyorrhoea alveolaris began as a gingivitis. The interdental papillae were affected, these either shrinking down or leaving a space between the teeth or else becoming transversely creased. At this stage there was no discharge of pus. Pockets were then formed by the ulceration of the periodontal membrane and calculus was deposited on the necks of the teeth which became progressively looser owing to the loss of bone. The gingivitis was due to lack of, or inefficient methods of cleaning the teeth. Among the predisposing factors were mouth-breathing, the wearing of dentures, and inefficient mastication. If the lesions in the alveolar process were studied in skiagraphs it was seen that the bone was destroyed by a process of rarefying osteitis. The teeth themselves, even in early cases, showed absorption of the apices and translucent areas at the extremities of the roots. Conservative treatment was only justified in early cases where the pockets were quite shallow; local treatment must be persisted in by the patients themselves, or else relapse would follow. When general symptoms were present the affected teeth should be removed, but the incisors and the premolars might be retained if the pockets were not more than 5 to 6 mm. deep. In the majority of cases the use of vaccines was unnecessary, and without local treatment was totally useless; but if general symptoms were present an autogenous vaccine might do good. Dr. Talbot (Chicago) said that anatomically the alveolar process was a transitory structure and liable to be affected by constitutional disturbances. He did not agree with the last speaker that pyorrhoea started always as a gingivitis, but thought that it often began in the middle or apical region of the periodontal membrane. Dr. Rhein (New York) maintained that malnutrition played an important part in lowering the vitality of the alveolar process. Conservative treatment was quite justified if patients could afford the necessary time. Dr. Mendel (Paris) said that the epithelial rests in the periodontal membrane, first described by Malassez, might act as a focus of lowered resistance, and so cause pyorrhoea without gingivitis. Mr. E. Lloyd Williams (London) held that pyorrhoea was a specific contagious disease; it was never caused by constitutional disease or associated with gout. It could be cured in quite early cases only; in the later stages he had found vaccine treatment utterly useless. Mr. G. F. Colyer (London) said that comparative pathology showed that the disease always took the form of a progressive rarefying osteitis, more marked in the maxilla than in the mandible; the problem of treatment was one of drainage. Wherever general symptoms were present, extraction of the teeth was the proper treatment. Drs. Timine (Berlin), Ferrier (Paris), Zsigmondy (Vienna), Peter (Berlin), H. Jewell-Smith, and J. G. Turner also spoke, and Dr. Znamensky and Mr. Dowsett replied.

ENAMEL.

Professor Underwood and Dr. Lovatt Evans contributed a paper on the presence of organic matter in enamel. As a result of experiments, using Frankland's method of estimating organic matter in water or sewage, they found that human enamel contained from 1 to 2 per cent. Professor Underwood and Mr. A. W. Wellings, in a paper on the histology of enamel, described the structure of adult enamel and the appearances seen in the cells of the enamel organ. They also described the technique of staining and preparing sections with special reference to the *intra-vitam* method of Goldmann.

FRACTURE OF THE MANDIBLE.

Mr. Coleman (London) and Dr. Lorgnier (Calais) read papers on the treatment of fractures of the mandible. Mr. Coleman described a new form of clamp he had devised for obtaining better fixation of the fragments.

AGE OF DENTITION.

Mr. Dolamore (London), in a paper on the age of dentition in relation to crime, showed that by a study of the times of eruption of the permanent teeth it was possible to establish within close limits the age of a skull in a case of suspected murder. Dr. Talbot (Chicago) read a paper on periods of stress in their relation to child development or senility. At various periods of life extra demands were made on the organism; these periods of stress might give rise to pathological conditions if the organism were unequal to the demand made on it. The times of the temporary and permanent dentition were such periods, and deformities of the head, face, jaws and teeth were more prone to occur at these times.

DISCUSSION ON THE RELATION OF NASAL OBSTRUCTION TO DENTAL DISEASE.

At the meeting on Friday, August 8th, Mr. J. G. Turner, who opened the discussion, said that there was an intimate connexion between nasal obstruction and dental caries, for nasal obstruction was a prime factor in producing an irregular dental arch and teeth irregularly placed favoured the retention and stagnation of food and so predisposed to caries. As a result of nasal obstruction due to adenoid vegetations the children became mouth breathers. The tension of the soft parts acting on the maxilla compressed it laterally, producing the narrow or V-shaped arch. Although the maxilla was mainly affected, the mandible did not entirely escape; the constant fall of the depressors of the mandible tended to cause it to bend downwards in front of the masseter muscle. Concurrently with this there was a failure of growth of the jaws; the cause of this was difficult to explain, but it might be the result of undue and practically constant compression of mouth breathing or of chronic nasal catarrh. If the adenoids were removed early enough, growth was resumed, but lost time was never made up. Treatment by regulating the teeth failed if the nasal obstruction was not removed and the mouth breathing corrected. He did not think that it was possible by expanding the dental arch to widen the floor of the nose. As shown by Cryer, the *x* ray appearance of a widened suture was fallacious, for such an appearance could be found in skulls of almost any age.

Dr. Ferrier (Paris) said that nasal obstruction produced a disturbance of function in the nasal passages with various results. The base of the skull was diminished in the transverse diameter owing to the tension of the muscles of mastication acting on their bony points of insertion; as a result of this the hard palate was drawn upwards. The alveolar borders of the maxilla were compressed laterally by the pressure of the tense muscles and cheek. In the mandible the antagonism of the masseter, pterygoid, and temporal muscles on the one hand, and the depressors on the other, opened the angle of the jaw; in addition, the action of the masseter tilted inwards the alveolar border with its contained teeth.

Dr. Smith (Buffalo, U.S.A.) thought that it was quite possible to widen the floor of the nose by expanding the dental arch, and Dr. Maggioni (Milan) referred to experiments in America in which the teeth of rabbits had been ground down on one side so that occlusion was impossible, and it was found that a lack of development followed. Mr. Lewin Payne pointed out that in the narrow arch the

height of the palate was more apparent than real. Measurements he had made showed that it was not really higher.

Mr. Colyer said that nasal obstruction was the commonest cause of dental deformities. If a child suffered from adenoids between the ages of 2 and 6, it would almost certainly have a narrowed arch and irregular teeth. Drs. Rhein (New York), Talbot (Chicago), and Chompert (Paris) also spoke, and Mr. Turner and Dr. Ferrier replied.

Independent Papers.

Stomatitis.

Dr. Cruet (Paris) read a paper on ulcerative stomatitis and mercurial stomatitis, in which he described several forms of stomatitis differing in their etiology.

Mr. K. W. Goadby said there were two varieties—one mercurial, which was polymicrobic, and one in which the *B. fusiformis*, *Spirochaeta dentium*, and occasionally *B. tuberculosis* were found. He doubted if a lead stomatitis existed. The blue line was caused by lead dust settling in the mouth and being converted into lead sulphide by bacterial action.

Pyorrhoea and Cancer.

Mr. F. Steadman read a paper on pyorrhoea alveolaris as a predisposing cause of cancer of the alimentary canal and associated parts. He said that, excluding cancer of the sexual organs, over 86 per cent. of cases occurred in the alimentary canal. He had examined 143 cases of cancer of the alimentary canal, and had found that pyorrhoea alveolaris was present in all cases. In most of them the condition was very marked. He thought that the constant swallowing of pus led to a chronic irritation of the mucous membranes, which in its turn was followed by cancer. Mr. Turner welcomed the paper, for he was sure that dental sepsis was a prolific source of disease. He had seen several cases in which cancer had arisen as a result of oral sepsis.

Arthritis Deformans of Mouth Origin.

Mr. Goadby said that he had obtained from the mouth in cases of pyorrhoea an organism showing special morphological and cultural characters, which he called the *Streptococcus malae*. Pure cultures of this organism injected into the knee-joints of rabbits resulted eventually in arthritic changes. Inoculation with cultures of other mouth organisms did not produce any changes. In patients suffering from pyorrhoea associated with arthritis, he had isolated the same organism from the mouth and urine, and in some cases the faeces. He regarded the arthritis as being caused by a process of subinfection from the mouth; it took a long time to develop. Local treatment of the mouth was of itself insufficient to cure the arthritis; vaccine treatment over a long period of time was needed as well.

Papers were also read by Dr. Lebedinsky (Paris) on Vincent's angina, and by Mr. Hopewell-Smith on the microscopical anatomy of gingivitis.

Discussion on Dental Disease in Relation to Public Health.

Dr. Sim Wallace, who opened this discussion at the meeting on Saturday, said that defective teeth impaired the power of efficient mastication and the proper preparation of food. Pathogenic bacteria entered the pulp of carious teeth and caused the formation of alveolar abscesses which might have serious results. Infected material round the necks of the teeth might be transferred to more remote parts and set up infection. Dental caries must be regarded as a sign of persistent dietetic error. The bolting of food due to inefficient mastication was a fruitful source of dyspepsia in childhood. Many diseases, though not arising from the teeth, were aggravated by oral sepsis, such, for instance, as tuberculosis, typhoid, and scarlet fever. The cause of dental caries was the undue lodgement of plaques or masses of acid-forming bacteria, together with fermentable carbohydrates, when the acid formed was protected from the action of the saliva by the impermeability of the mass. To prevent dental disease during the first two and a half years of life all starchy or sugary foods except milk should be given in a fibrous form so as to stimulate mastication and insalivation. Bread, rusks, or other farinaceous food should never be added to milk. Bread with crust, or toasted bread and butter, should form a considerable amount of the solid part of the meal. The solid food should be eaten first, and the milk and water afterwards. After the age of 2½ years, the child should have a considerable amount of farinaceous food in a form which stimulated a pleasurable amount of mastication. The albuminous part should be presented in the form of boiled fish and meat. Milk and milk substitutes should only be allowed in small quantities. If soft, starchy, or sugary foods were taken they should be followed by food of a detergent nature. Three meals daily were preferable to any greater number. Sweets, biscuits, and milk should never be taken between meals or before going to bed. Raw fruit was excellent, especially in the form of apples. The doctrine that sugar was to be regarded as a cheap food and a protein sparer was fallacious. The food of poor children was largely composed of bread or other cereal foodstuff; from this source they were compelled to derive practically all their protein, and it necessarily followed that they had a surfeit of carbohydrates. A considerable number of dental surgeons had been teaching their patients to avoid these errors of diet, with beneficial results to their patients. Much, however, remained to be done, especially in the way of teaching a proper system of dietetics. The physiology of oral hygiene must receive due recognition, and be taught to medical students in future as far as possible by a deduction from general principles rather than by reference to the details of odontology.

Dr. Trewby King (New Zealand) said that there was no subject of more importance to the medical man than this. He had been engaged in teaching the public along these lines for many years.

Mr. Colyer pointed out that in the South African war 2,541 soldiers were invalided home on account of defective teeth. The cost of equipment, etc., of each soldier was not less than £100, so that this represented a loss to the nation of over £250,000. Each year many men were invalided out of the navy and army for defective teeth. Then again the full benefit of sanatoriums could only be obtained if the patients had clean and efficient mouths. He thought that the reason why teeth decayed was the increased use of fermentable carbohydrates. Sugar, especially in the form of sweets, was largely responsible. There ought to be public instruction throughout the country, but it should be given by persons in authority. At all school clinics at the same time that the children were treated the parents should be taught the elements of oral hygiene.

Mr. J. G. Turner said that he had sought for a cause of dental caries with a view to its prevention. The lines he had investigated were the feeding habits correlated with the amount of dental caries. He had come to the conclusion that with soft sticky foods there was caries. If the food did not stick to the teeth there was no caries.

Mr. Maggs discussed the question of immunity from caries. He thought it was due to a free secretion of saliva, slightly alkaline and of low specific gravity. Dr. Baker (Dublin) thought that the increase in use of finely-ground flour was responsible for the increase of dental caries. Drs. Gibbs (Edinburgh), Amoedo (Paris), and Talbot (Chicago) also spoke, and Dr. Sim Wallace replied.

HYGIENE AND PREVENTIVE MEDICINE.

The Value of Experiments on Animals.

On opening the first session Dr. Newsholme (President) remarked that the whole programme of the Congress was imbued with the spirit of preventive medicine. He then proposed a resolution to the effect that the Section recorded its conviction that experiments on living animals had been of the utmost service in the past, and considered that every facility should be afforded to competent persons for the purpose of such experiments carried on under adequate supervision. The resolution was seconded by Sir Arthur Whitelegge, and carried unanimously.

Dust and Disease of the Lungs.

At the request of the President, Sir A. Whitelegge (His Majesty's Chief Inspector of Factories) then took the

chair. The rest of the morning session was occupied in a discussion on the effects of dust in producing diseases of the lungs. There was a remarkable unanimity among all the speakers as to the main point brought out by the introducer of the discussion—namely, that the excessive death-rate from phthisis caused by the inhalation of dust was due to the particular inhalation of particles of free crystalline silica.

The opener of the discussion was Dr. Edgar M. Collis (H.M. Medical Inspector of Factories), who gave an abstract of his printed paper, copies of which were circulated amongst the members present, who thus had an opportunity of studying at leisure this very able and exhaustive document. Dr. Collis first referred to the fact that dust inhalation had long been recognized as associated with lung diseases, Pliny having stated that Roman polishers with red lead used to wear respirators, and references to the association of dust and disease occurring in works written in the Middle Ages, such as *De re metallica*, by Georgius Agricola. Dr. Collis classified dusts according to their origin, dividing them into three groups—animal, vegetable, and mineral. There was no certain evidence that animal dust caused any form of pneumonoconiosis. As to vegetable dust, the workers chiefly affected by it were those employed in the flax, jute, and cotton industries, such as cotton strippers, who removed débris and dust from cotton carding machines. The train of symptoms in those affected was marked and distinct from other forms of pneumonoconiosis, the men suffering from a peculiar shortness of breath, and a condition closely resembling asthma, with spasmodic dyspnœa, band-shaped chest, fixation of the diaphragm, with scanty and tenacious sputum. These people were not specially prone to phthisis, like the inhalers of mineral dust, and well-planned methods of dust removal which had recently been adopted in the cotton-spinning mills of Lancashire were rapidly ridding the cotton industry of the disease. With regard to mineral dust, it was necessary to differentiate certain kinds of dust which were injurious from others which were comparatively innocuous. Thus there was no high mortality from phthisis among men employed in the manufacture of cement, plaster-of-Paris, and slag-wool, coal miners and brick makers, though all were exposed to excessive amounts of dust. Reference to one of his published tables showed that individuals exposed to dust lost their power of chest expansion early, and simultaneously developed a high blood pressure. Even if no tuberculosis developed their lungs were liable to be more and more thrown out of action. The heart became dilated, and œdema and ascites developed. The results of his investigations had led him to the conclusion that inhalation of mineral dusts containing free crystalline silica was associated with an excess of phthisis—an excess which bore a direct relation to the amount of that material present. His first clue to this deduction was obtained from a study of the mortality experienced by flint knappers, who pursued an interesting handicraft, handed down from neolithic times, and who inhaled a pure dust compound of free crystalline silica unmixed with other constituents. Confirmation of the theory was afforded by an investigation into the phthisis death-rate among stone masons, who everywhere prepared stone for building purposes in the same way, and yet showed very different mortality in different places—high when sandstones which contain silica were worked, and low when limestones not containing silica were dealt with. From statistics gathered from the mortality-rates among 70,300 males working in trades where they were exposed to silica dust, he found that there were 754 deaths annually due to phthisis, whereas the normal annual death-rate from phthisis in such a population would cause 141 such deaths, which gave an excess of over 600 deaths due to tuberculous silicosis. It was not clear how silica played the part it did in predisposing the lungs to phthisis, but it appeared to be due rather to the chemical composition of the dust particles than to their shape. Another remarkable point, which had been noted by many independent observers, was that the tubercle bacilli in cases of silicosis showed less infectivity than in ordinary pulmonary tuberculosis. He hoped that that day's discussion would induce others, especially chemists and bacteriologists, to investigate those problems.

The Characteristics of Dust.

Professor Heim (Paris) thought that occupations having to do with dust should be classified, not according to the nature of the work or the origin of the dust, but according to the prominent characteristics of particular kinds of dust. Proceeding on these lines, he distinguished two main groups: (1) active, and (2) passive or inert dusts. These main groups he subdivided as follows: The active group into (1) toxic dusts, such as pure lead, arsenic, or mercury; (2) caustic dusts, such as workers with chromic acid, phosphorus, lime, or cement would be exposed to; (3) infectious dusts. No doubt any dust might be the vehicle carrying micro-organisms to the lungs; but in this connexion he specially referred to broncho-pulmonary anthrax, which was well known to be caused by inhaling specific dust from wool, skins of animals, etc. In the inert group he distinguished (1) soft or flexible dusts, which penetrated with difficulty, being easily expelled by the cilia of the mucous membrane of the nose or rejected by coughing; such were the dusts from wool, cotton, feathers, etc.; (2) hard dusts, having the property of wounding and penetrating. These were much the most numerous and had been most closely studied. They included coal dust, silica and lime dust, iron, copper, zinc, and wood dust. The anthracosis caused by these various dusts he classified as acute and chronic, the acute being caused by the active and the chronic by the inert dusts. There was a large field open for research as to the nature of these various kinds of dust and the diseases they produced, and he laid special stress on the importance of radiology in their diagnosis, and the point as to whether the entrance of the dust was by the digestive or by the pulmonary tract seemed one to which particular attention might be directed.

Professor Carozzi (Milan) followed, but the only additional point of importance he brought out was that in Sicily medical men at the sulphur mines had noticed that the miners, however seriously affected with pneumonoconiosis and chronic lesions of the bronchi, never or hardly ever suffered from or died of pulmonary tuberculosis.

Dr. Murray Leslie (London) thought that this lessened infectivity of silicosis mentioned by Dr. Collis could be explained, like miner's phthisis in South Africa, by the dryness of the disease and the fact that it caused so little expectoration. He suggested that the evil effects of silica might be explained by the sharpness of the particles, pointed out that the roots of the lungs were usually first affected, and drew attention to the value of radiography in diagnosis.

Dr. Angus Macdonald (Kingston, Jamaica), in confirmation of Dr. Collis's views, mentioned that, though for a long time in practice in a colliery district, he had never seen a case of miner's phthisis; and to prove the innocuousness of limestone dust he instanced the rarity of pneumonoconiosis in Kingston, although, on account of the road metal being composed of limestone, clouds of dust were constantly being inhaled by the inhabitants of that city.

Dr. M. Price (Niagara Falls, U.S.A.) stated that in the city where he lived there was a higher death-rate from tuberculosis than in any other city in the State, and attributed this fact to the large proportion of the population who worked in factories for making graphite, calcium carbide, and carborundum, all of which produced much dust. Further confirmation of Dr. Collis's views came from Dr. Barwise (M.O.H., Derbyshire), who stated that in his district the death-rate from phthisis amongst workers in gritstone was 13.7 per 1,000, whereas it was only 1.52 amongst workers in limestone, and 0.68 in coal-miners. Dr. Leslie Mackenzie also spoke, and the Chairman, Sir A. Whitelegge, in summing up the discussion, paid a high tribute to the work of his colleague, Dr. Collis, and only regretted that the limits of the discussion had prevented him from detailing the methods adopted for ameliorating the conditions under which operatives in dusty trades worked, as a great deal had been and was still being done in that direction. At Sir A. Whitelegge's suggestion, the members then adjourned to the Pathological Museum, when Dr. Collis treated them to a most lucid exposition of his exhibits, consisting of specimens of the different kinds of dust referred to, photographs of workers in the various trades dealt with, *x*-ray photographs of the effects of dust

on the lungs, and pathological specimens also demonstrating those effects.

Pellagra.

At the afternoon session the chair was taken by Dr. Chalmers, M.O.H. Glasgow, and Dr. E. H. Beall of Texas, U.S.A., read a paper on the invasion of America by pellagra. Six years ago this disease was of purely academic interest to the American physician, while now there were 30,000 pellagrins in the United States, and the mortality was over 25 per cent. The cause of the disease was unknown, but the fact that under ordinary conditions of life it was more common in women than in men, while the sex incidence was fairly equal in institutions when both sexes lived under similar conditions, pointed to the conclusion that the contagion had something to do with house and home conditions. Dr. Sambon's theory that the *materies morbi* was carried by the simulium fly was not borne out by his observations of the disease in Texas. Other papers read were: Researches as to the Efficacy of some of the Ordinary Disinfectants, by Dr. Bernhard Vas, Budapest; and Lead Poisoning in Printers and Type-setters, by Dr. Dezso Hahn, Budapest.

FORENSIC MEDICINE.

The first meeting of this Section took place on Wednesday, August 6th, at 3 p.m.

President's Address.

Professor Harvey Littlejohn, in taking the chair, said that he did not propose to make a long introductory speech, but must thank the Section for the honour it had conferred on him of making him President. He then alluded to the value of international congresses as putting the seal on the universality of science and the brotherhood which existed amongst scientific workers all over the world. At the last Congress (held in London in 1881) he said forensic medicine had been allotted only half a Section in the company of Hygiene, and under the title of State Medicine it had since grown wide enough to require a section to itself, thanks to the labours of those who had built on the foundations laid by Taylor in England, by Caspar, Hoffmann, and Brouardel on the Continent. Amongst the able investigators and leading medical jurists of to-day, he was specially pleased to welcome Professor Strassmann from Berlin, Thoinot from Paris, and MacTaggart from Canada, Schächter from Budapest, who, amongst many others, had promised to take part in the present proceedings. He regretted, as he felt sure the whole Section would do, that illness prevented the presence of Professor Zangger of Zurich. He trusted that the discussions of the Section might lead to a sound administration of justice and to the benefit of the public welfare. He then alluded briefly to the matters of interest which the Section had provided, in addition to papers: To listen to a coroner's inquest, a relic of past ages; to visit Scotland Yard; to visit Broadmoor Criminal Lunatic Asylum, remarking that the Medico-Legal Society of London had kindly undertaken to provide motor cars to take visitors to the latter place through some of the prettiest scenery of England; to visit an English prison; and even, should any one desire it, to visit a Court of First Instance.

Medico-Legal Methods in Hungary.

He then called upon Dr. M. Schächter (Budapest) to read his paper on the Royal Medico-Legal Senate in Hungary—a paper of considerable interest as showing what can and has been done (for twenty-three years) elsewhere in an endeavour to arrive at the truth in a court of law when medical evidence of a highly technical, not to mention controversial, nature is in question.

It appears from Dr. Schächter's paper that in Hungary there is a Medico-Legal Senate, consisting of a president, a vice-president, and twenty other members representing all branches of medical science. Questions are submitted to this Senate by the law courts for final settlement ("super-arbitration" is the term used); these questions are first reported on by various members of the Senate nominated specially for the purpose by the President at a sitting of the Senate. The report of these nominees is then considered by the Senate as a whole, and if then adopted by a majority it becomes, *ipso facto*, the report of the Senate on the matter. On questions of particular importance two members are delegated to report on the same subject, and to give their opinion independently of each other. If the details supplied by the law courts are not sufficient for the Senate to make up its mind, then, if possible, further particulars are furnished, permission is given to the member delegated by the Senate to examine directly the person concerned, or exhumation is ordered to take place, etc.

Dr. Schächter drew attention to the advantages of such a special institution, owing chiefly to the fact that it had no other *raison d'être* but that of ascertaining the strict scientific truth. He said that its decisions were rapidly gaining in weight and authority in all matters of civil law; in criminal cases it had not proved so useful, as it had occurred but seldom that juries had asked for its opinion, but he hoped that even here things might improve, for the esteem enjoyed by the decisions of the Senate in the public mind was steadily growing higher, and he was in hope that it would eventually make "conflict of medical evidence a thing of the past."

Professor Strassmann, in discussing the paper, pointed out that fresh evidence might arise subsequent to the Senate's decision, and asked how it could be revised in the view of the new evidence; he rather preferred the methods of Germany.

Professor Littlejohn remarked in regard to the Hungarian plan that a fundamental change would be required in English law before it could be adopted over here owing to this one crucial point—namely, that with only a few very stringently guarded exceptions, nothing but oral evidence was admitted in British law courts, evidence that could be and was submitted to the very severe test of cross-examination.

Dr. Schächter replied briefly.

Conditions Resembling Drunkenness.

Dr. Fred. J. Smith read a paper on this subject, which we hope to publish at a later date; here it suffices to say that Dr. Smith's main contention was that unconsciousness was not a necessary accompaniment of the onset of a meningeal haemorrhage, and that a man might be both drunk *and* dying without an early exhibition of unconsciousness.

Dr. Frank Wethered, in discussing the paper, mentioned the case of a man who was knocked down while on his way to be shaved, got up at once, went to the barber's, and walked back before becoming unconscious, although he was all the time suffering from meningeal haemorrhage the result of his fall. He said that this case strongly corroborated Dr. Smith's view.

The Medico-Legal Aspects of Infant Mortality.

The Section was occupied on the morning of August 7th with a discussion on this subject, which, in the absence of the French "reporters," was opened by a paper read by Professor Strassmann of Berlin.

After referring to the importance of maintaining and increasing the population of a country, he advocated a reduction in the death-rate as the best means of increasing census numbers, and particularly a reduction in the death-rate of children. He then dealt with two of the largest causes of mortality amongst children—namely, "overlaying" and wilful starvation. The former, he said, was a very common incident, but that it was far more frequently suspected than proved, because, in the first place, definite signs of suffocation in the body were frequently absent, and, in the second, there were very often found pathological conditions which might explain death; whereas, in order to prove the suspicion of negligent suffocation, one must have either (1) no other possible cause of death or (2) some signs of violence arising from the nature of the accident, such as a broken rib; and in five years he had not found one single case capable, by *post-mortem* examination, of irrefragable proof of the overlaying being the actual cause of death. He then discussed somewhat fully the part that an enlarged thymus might play in such cases. He said it was admitted that the condition known as status lymphaticus, of which an enlarged thymus formed a prominent feature, could lead to death; but, he asked, Could it lead to *sudden* death? He suggested that the thymus might do so by mechanical pressure—a sudden vascular engorgement—on either the trachea or on the heart; he suggested that convulsions in children

might lead to such a sudden engorgement and so to sudden death. He then drew attention to the frequency of bronchial and gastro-intestinal catarrh in children the subjects of status lymphaticus, and said these catarrhal conditions might be considered to play a possibly prominent part in such sudden deaths, and anyway their presence could not be neglected. With all these very indefinite factors possible he said that rigorous proof of overlaying was the rarest of events, and quoted his statistics of five years in proof of his statement. He then proceeded to his second point—namely, criminal or negligent starvation, especially of illegitimate children (*Engelmacherei*). He thought cases were less common than they used to be, and drew attention to the difficulty of distinguishing between insufficient and improper food. In Prussia, he said, "we have an excellent rule that all children that die in nursing institutions without proper medical attendance and certification shall have an autopsy performed upon them by a skilled pathologist." With this precaution, he said, it was still a difficulty to successfully prosecute baby-farmers on the specific charge of starving the infant to death, because of the wide divergence of opinion as to what constituted proper feeding for infants, and hence he had his doubts as to the political wisdom of instituting prosecutions in any but gross cases.

A discussion followed the reading of the paper, in which Professor Littlejohn said that he could not satisfy himself that the thymus ever pressed on the trachea, though it might do so on the heart and so cause death. As regards the general condition of status lymphaticus, he recognized it in general terms on the *post-mortem* table, and that, too, in cases in which the absolutely final cause of death was obscure—for example, chloroform inhalation and overlaying—but he was unable to state precisely the exact relationship between death and the status lymphaticus. He thought that the view of the bed and bedroom and other surrounding circumstances connected with deaths from overlaying were equally or more important than the necropsy in verifying the diagnosis. Catarrh of bronchi and bowel might be too easily found or too easily overlooked; their position was very equivocal.

THE FEEBLE-MINDED CRIMINAL.

Dr. Treadwell then read a paper on conduct in the feeble-minded criminal. He said: "A criminal is taken to mean a person who has committed some offence which has resulted in his coming to prison under a term of imprisonment or penal servitude. The term 'feeble-minded' or 'weak-minded' is used in prison parlance to denote all kinds of mental disorder which appear to indicate lessened responsibility. It is sufficiently comprehensive to include several classes, in all of which there is to be observed mental defect, ranging from slight degree of divergence from a standard, called by the observer the normal, to conditions of mental alienation just short of certifiable insanity." He then attempted to indicate a line between the feeble-minded and the intellectual but merely vicious criminal—a line only to be drawn by conduct; and that of the feeble-minded, he said, was usually characterized by personal defilement and destroying of his cell, destruction of utensils, obstinacy of unusual degree; in the vicious criminal of higher intellectual type such conduct was seldom seen. He then discussed the management of such feeble-minded criminals, and said: "That some notice must be taken of these disorders of conduct, and some form of punishment, such as loss of diet, confinement to cell or room, or deprivation of privilege, must be administered, will, I feel sure, be admitted by all who have had to deal with this class of criminal. To take no notice of his delinquencies would certainly be put down to weakness by the prisoner himself, and lead to continued acts of insubordination; but I think we are justified in our methods of modified prison discipline and modified punishments suitable to each individual case as it arises, judged upon its merits at the time and guided by the results achieved." Dr. Treadwell's opinion was that careful segregation was the fundamental basis of management, leading to less discontent and feeling of injustice, and probably therefore less disorder of conduct.

Dr. Baker, of Broadmoor, in discussing the paper, said that Dr. Treadwell had omitted the peculiar ease with which these feeble-minded criminals were led away by bad examples—easy impressionability. Few of them came to Broadmoor.

Dr. Nicolson, late of Broadmoor, said the peculiar mental bent of the animal was the chief cause of trouble, and often enough it was an accident whether this led to an asylum or to prison. He had great hope that the new Act (care of the feeble-minded) would improve matters by providing for the segregation suggested by Dr. Treadwell. He congratulated the Section on the publicity which the matter might now gain. Some years ago publicity was anathema maranatha to officials at the head of the service.

Professor Glaister hoped that in time to come they would be able to classify—and to treat—mental derangements as easily as bodily ones.

Dr. Scott, late Governor of Holloway, agreed with practically all Dr. Treadwell had said, and, like Dr. Nicolson, had great hopes of the new Act.

Dr. Nicolson then read a very interesting paper on mind and motives—a note on criminal lunacy. The paper hardly admits of condensation, but was written in his usual common-sense style, and was full of illustrations of the difficulty of estimating motives from any special mental attributes.

SHORT PAPERS.

A paper by Dr. Angelo de Dominicis on the diascope of minute blood traces was then presented to the Section. In it the author claimed that this method was quite the most difficult known to science.

Dr. Oscar Jennings then, in a short communication, drew attention to the smears of drops of drug solution which were so frequently left by morphine and cocaine takers on the books they were reading; the drops represented the overflow from the syringe and from the injection, such *habitués* frequently using this drug while reading.

THE TEACHING OF FORENSIC MEDICINE AND THE ORGANIZATION OF A MEDICO-LEGAL INSTITUTE.

On Friday, August 8th, the morning was occupied in a discussion of this matter, which the Chairman said was of special importance to London at the present moment, because London was engaged in an attempt to set her teaching of medicine and the allied sciences in order, and it was possible that the discussion might enable her to set medical jurisprudence on a sound and enduring basis.

Professor Zangger (Zurich) then read a paper in which legal medicine and its teaching were treated as an abstract science. He first drew attention to the peculiar or special point of view from which a physician must observe an ordinary case of illness or accident to the end that the legal problems which might be raised in connexion with it might receive a correct and just solution. The horizon of this point of view had expanded, and the solutions of the problems had become more intricate and exact, just in proportion to the never-ending development of the natural sciences ancillary to medicine. He then considered the relationship of medical jurisprudence to sociology, and pointed out that it was that of general pathology and pathological anatomy to medicine and surgery in general; it was only the influence of medical jurisprudence that had rendered all modern health legislation possible or even thinkable; each new discovery of medicine suggested new legislative regulations, and these in turn begat fresh medico-legal problems demanding scientific solution. He touched on the teaching of the subject, and pointed out how each new problem laid a fresh burden on the teacher, and thus in turn the burden was transferred to the student—he must learn to observe more closely all the facts connected with his case; he must learn to know when further reports were necessary on points outside his own reach; he must have experience of the living conditions of workers, and thus must learn the elements of preventive medicine which was the mother of legislation intended to guard the safety and preserve the health of manual workers. He put in a plea for giving students a share in the responsibilities connected with their cases right up to the final consequences of the jury's or judge's verdict. Finally, he considered the duty of the State towards forensic medicine, and showed that, as the State was continuously by legislation (criminal and civil,

including Insurance Acts for workers, etc.) throwing fresh burdens of responsibility on to medico-legal backs, so it must in its turn assume a responsibility for founding and maintaining institutions wherein the science and art of bearing these burdens might be taught both in theory and practice; nor must the State interfere too much in such institutes, even though it provided the money to pay for them.

Professor L. Thoinot (Paris) followed with a paper on the practical aspects of the subject. He commenced by asking three questions: (1) To whom should forensic medicine be taught; (2) how should it be taught; (3) how should a medico-legal institution be organized? He answered the first question by stating that he thought all medical students should receive elementary instruction in the subject, because all medical men were supposed to be able to examine a wound or make an autopsy, or examine the victim of rape for medico-legal purposes: he thought also an examination should crown such studies. He would have higher teaching and examination for those wishing to be specialists. The second question he answered by pleading for practical as well as theoretical teaching, though he admitted the difficulties in the way, such as lack of material in small communities, and the admission of students and others to important autopsies, or to witness critical experiments. As for the organization of an institution for legal medicine, he thought that it should have complete autonomy, and a building apart from the rest of the hospital. In it there should be a morgue and a complete personnel, and complete laboratory fittings, apparatus, etc., for teaching and demonstration purposes; lecture-room, library, museum, etc. He stated that Bucharest, Budapest, Breslau, Zurich already possessed such excellent institutes, that Paris was building one—why had not London got one or two such?

In a plea for higher consideration for legal medicine, Dr. Angelo de Dominicis made use of language concerning it which is worthy of reproduction. He said: "Its importance arises from the importance of legal medicine's special and multiform practical applications—from the vastness of her doctrine, and from the need of special training; famed authors, learned and elegant writers have not hesitated to assert that legal medicine consists in the art of applying to forensic cases the knowledge of medicine, with the result that the public has mixed up with the science of the subject the idea that it consists in the formal and easy-to-be-acquired practice of drawing up expert reports." Against this latter view he protested with all his powers that legal medicine should be understood as a real biological science, particularly suited in the vastness and multiformity of its relations to obtain results of analysis and synthesis of overwhelming importance. It was a biological science when it arrived at results of such biological importance.

Sir William Collins congratulated the Section on having papers before it representing, so to speak, the production and distribution of forensic-medical knowledge. He echoed Professor Littlejohn's hope that London might now be able to do something for the subject worthy of the capital, but hoped that the State or municipality would not insist on interfering too much with the teaching simply because it provided the money.

Professor Glaister put in a plea for more practical teaching of forensic medicine, though he fully recognized the difficulties in the way of admitting students to autopsies and other practical aspects of the matter, which must—at first at any rate—be of a somewhat confidential nature. A medico-legal institute of a complete character and with sufficient material for teaching could only be established in large centres of population, and even then he felt that many practical obstacles to its working—removal of bodies, etc.—might arise and would require care in their removal.

Dr. F. J. Smith referred to the enormous increase of late years in the civil as opposed to the criminal cases in which medical evidence was required. He felt inclined to suggest that the subject should be placed in a compulsory post-graduate course of instruction.

Professor MacTaggart (McGill University) stated that he had started a medico-legal clinic, with the sanction of his colleagues, the cases being sent to him both from the out-patients and the wards.

Under the influence of remarks by Professors Schächter, Pappe, Morrison, and the Chairman, the following resolution was then brought forward and carried unanimously:

> That in the opinion of the Section it is advisable that the subject of forensic medicine should be taught both to students of law and students of medicine; that the course should be compulsory for both; and that it should be followed by an examination of an elementary nature for all students; and that those who desired to practise the subject more or less exclusively after qualification should be compelled to pass through a course of more thorough practical instruction on both living and dead material, should be compelled to pass a special examination, and should receive a special diploma on passing the examination.

INDEPENDENT PAPERS.

Friday afternoon was occupied with the reading of the following papers:

Motor Car Accidents.

Professor Strassmann (Berlin), in discussing injuries from motor cars, said that he had been led by his experience to the view that while death was occasioned by severe internal injuries, it was more common in motor car accidents than in those due to other forms of wheeled vehicles to find the skin undamaged. He thought that the explanation might lie in the comparative speed of the two classes of vehicles. The utility of the observation, if corroborated, lay amongst the cases where a dead body was found in the street, in which both forms of traffic were continually passing, and in which the account of the accident, if there were any, had left it in doubt to which particular vehicle the accident had been due. He further drew attention to a possible means of distinguishing between suicide and accident in cases where death was due to mechanically drawn vehicles, including trains, trams, etc. It lay in this fact, that a suicide commonly laid himself across the line of a wheel so that the damage took place in a transverse plane of the body, whereas in accidents the damage was of a much more irregular nature, the person being more commonly struck on the side and so thrown away from the direct line of progress.

Dr. F. J. Smith felt himself unable to corroborate the comparative rarity of the escape of the skin, as he had in his mind the case of a body whose lung was completely severed at the root by the wheel of a cart, and in whom the skin revealed not the slightest trace of any injury or bruise.

The Shape of Blood Stains.

Professor Ziemke (Kiel) then read a paper, illustrated by a large number of photographs, which were passed round the Section, on studies of the shape of blood stains. He stated that, starting from the ordinary observations on the differences between the stains obtained by the spurting of an artery and the mere pouring out of blood from a vein, he had been led to make experiments to determine whether other and further deductions could be made from the shape, size, and other appearances of blood stains—deductions, that is, in regard to the actions or position of the shedder of the blood. His experiments took the form of starting a haemorrhage and then making the animal run, walk, jump, etc., while receiving surfaces were placed in various positions and at various angles with regard to the direction of progression; he also got pools of blood and struck down on them with various objects and photographed the resultant splashes.

The photographs showed, as indeed was to be expected from the laws of hydrostatics and hydrodynamics, that when a drop or splash of blood had small excrescences these always projected from the main body in the direction which the drop of blood was pursuing at the moment of impact—a conclusion which might under certain conditions be of importance in showing the method and direction of progress made by the victim while bleeding.

There could be no doubt about the very great variety of the conditions of a blood stain, as shown by the photographs, but it did not seem so clear that decisive conclusions of great value could be drawn.

Diachylon as an Abortifacient.

Dr. Arthur Hall (Sheffield) traced the origin of the use of diachylon as an abortifacient from the eighteenth century in sporadic form, and then remarked that it had assumed the nature of an epidemic about the end of the nineteenth century. The paper contained nothing of a strictly medico-legal interest, but was deeply interesting from a sociological point of view, as traces were visible in

it of a relation between bad trade and the prevalence of abortion. His cases, too, offered an interesting corroboration of the view that for a simple abortifacient drug to be efficient it must be taken in doses dangerous to the life of the taker.

FRACTURE OF THE SKULL.

The Section then adjourned to a dark room, where Professor Ruppe of Königsberg showed lantern slides of fractured skulls illustrating a very ingenious observation of his which made it possible to determine which blow of, say, two or three definite acts of violence causing separate fractures of the skull had been inflicted first. The point was that from each point of fracturing impact, fractures ran from the angles of impact; tracing now one of these running fractures if it were cut across in its path by a direct or by a running fracture from a second separate blow, it became obvious at once that the second fracture was really second in point of time to the first one; if, on the other hand, the first running fracture ended abruptly at the edge of another direct fracture, it was at once obvious that the running fracture, and therefore the violence that caused it, was second in point of time to the other direct fracture. The slides made the point quite clear, though the description may read somewhat complicated.

VISIT TO SCOTLAND YARD.

Immediately Professor Ruppe's demonstration was finished the Section, or, rather, a limited number of its members, were driven to Scotland Yard and there shown a large series of finger-prints as official records. They were also shown over the gruesome museum of crime housed at the Yard. Though interesting to the individual members, there was nothing of public interest for a report of the Section.

CONTROL OF VENEREAL DISEASES.

On Saturday, August 9th, the Section combined with that of Syphiligraphy for purposes of a joint discussion on syphilis: its dangers to the community and the question of State control, which is reported at page 372. One and all—English, French, German, and every other nationality—deplored the waste of life and the invalidity of the nation caused by the ravages of venereal diseases. Each picked out some particular reason for the apathy of Governments and for the undoubted increase in the number and variety of diseases due directly to syphilis. Each chose some more detailed and special means for combating the plague—one laying stress on education of youth, another compulsory registration, another compulsory notification and treatment, etc.; but with no uncertain voice the combined Section agreed that something *must* be done, and, finally, unanimously passed the comprehensive resolution the terms of which cannot be too widely known.

DISCUSSION ON ALCOHOLISM AND DEGENERACY.

On Monday morning, August 11th, a discussion on alcoholism and degeneracy was opened by Dr. B. Laquer of Wiesbaden, who began (speaking in English) with a review of the efforts he had been making for a good many years to combat the evil of drunkenness in Germany, stating that the quality of the population was of much greater importance to the nation than its mere quantity, and alcohol caused a deterioration in quality, whatever its effect upon quantity might be. He then went on to read the formal paper which he had written, in the course of which he said that O. Bumke had defined degeneration not as a disease but as an abnormal pathological condition which was particularly capable of leading to disease, while a psychopathic constitution or inherited burden of debility meant almost the same thing, and he understood degeneration essentially to consist in a condition of the nervous system of such a nature that it deteriorated from generation to generation. He then showed by quotations from various writers how this deterioration depended on the constitution of the ultimate nerve cell, also how far this constitution itself could be influenced by alcohol, and finally he summed up the results of his investigations into the matter in the following statements:

1. Clinical experience, statistics, and animal experiments all combine in proving beyond doubt the occurrence of an acute influence of alcohol of an injurious nature upon the germinal elements of cells. The ultimate intracellular circumstances of such injurious influence and its consequences need further inquiry by experiment.

2. Chronic alcoholism is one of the chief causes of the degeneration which passes from generation to generation; here, too, further work was, he said, imperatively necessary on the laws of degeneration. Considered statistically, in the light of family histories, clinical observations, and experiments, such work could best be carried out in special institutes for the study of alcoholism, such as had already been established in Russia, Sweden, and the United States of America, and one was in course of erection in Germany he was glad to say.

The discussion was continued by Professor Glaister, who said that his experience in Glasgow had led him to the conclusion that if the parents had been addicted to alcohol, and also their parents in turn, then the third generation of children were very likely to be degenerates. If, on the other hand, the parents came of a healthy stock, and were themselves healthy at marriage but subsequently became alcoholics, then the children born during the alcoholic period were more likely to be or to become degenerates than those begotten and born during the non-alcoholic period of the parents.

Dr. Saleeby then touched on the report of Professor Pearson, which he said had not dealt with Professor Glaister's point. He said that two-thirds of the official inebriates in licensed homes had given evidence of mental deficiency before they had given way to inebriety. He then referred to some experiments on guinea-pigs which were made to inhale the vapour of alcohol, and stated that the result of these was to show that the testicular and ovarian specific parenchymatous cells were always affected, and more so than the parenchymatous cells of other organs.

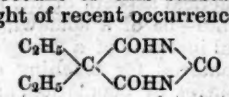
Dr. F. J. Smith said that he preferred to rely upon the experience of thousands of years and the customs and habits of probably billions of population rather than upon the experiments of a few pharmacologists and the statistics containing only a few thousands of individuals, and these considerations compelled him to the view that they were face to face with the eternally old question of moderate use *versus* immoderate abuse. He said that they were probably all unanimously against the latter, and that all quarrels arose over the former. He specially wished to emphasize his opinion that even Sir Victor Horsley and Professor Karl Pearson differed only in the matter of mathematics and logic, and not on the fundamental fact of the evil effects of the abuse of alcohol, Pearson objecting solely to the methods by which Horsley had attempted to *prove* these ill effects. Dr. Smith said that Horsley's method was attempting to solve one equation containing an enormous number of unknown factors. Finally, Dr. Smith expressed his belief that the cure for alcoholism was to be found in the general attitude of the public towards drunkenness and in the moral conscience of the people as a whole. Medical men could support the attitude and quicken the conscience until to be drunk was as rare a condition as to be a thief or a burglar.

INDEPENDENT PAPERS.

The afternoon of Monday was devoted to the reading of the following papers:

Veronal.

By Dr. W. H. Willcox, on veronal poisoning. He gave an exhaustive account of this substance, of very great interest in the light of recent occurrences.



was its rational formula, and diethyl barbituric acid its chemical name; its melting point, which was its most characteristic property, was 191° C.; he gave its solubilities and its mode of preparation. He said it was a pure hypnotic, with a dose of 5 to 10 grains, and that 50 grains was, or might be, taken as an average minimal fatal dose, though 10 was the smallest recorded. Toxic symptoms arose—(1) from idiosyncrasy; (2) single large overdose; (3) repeated small and medium doses—veronal habit, though this latter could not be acquired and carried to the same extent in dosage as the morphine or cocaine habit. Dr. Willcox further said it was much more toxic to people with kidney disease than to those with healthy kidneys,

and he further accused it of a cumulative action. He then detailed the treatment—washing out of stomach, hot coffee, etc.; but said that six hours was the maximum interval after ingestion, at which evacuation was practicable. Strychnine, digitalene, oxygen, and normal saline injections were also useful. *Post mortem* the appearances were indefinite, though patchy consolidation of the lungs might be found; this, with the fact that during life there might be pyrexia, had caused cases of veronal poisoning to be mistaken for pneumonia. As regards the detection of the poison after death, he said that there were many tests that might be applied to the pure substance, but had to admit that he knew of no satisfactory means for detecting it in or abstracting it from the tissues after absorption, hence the only means of proving the diagnosis was by collateral evidence apart from analysis of the viscera. He gave statistics of cases with a brief account of them, and concluded his paper by expressing his satisfaction at the fact that veronal and some other hypnotics had been placed in Part II of the Schedule to the Poisons and Pharmacy Act, 1908.

Professor Strassmann of Berlin said that cases of poisoning by veronal were extremely rare in Germany, owing to the legislative precautions holding in that country for the sale of drugs.

Workmen's Compensation Act.

Professor Glaister alluded to the ways in which a workman could claim damages against his employer: (*a*) At common law; (*b*) under the Employers' Liability Act; (*c*) under the Workmen's Compensation Act. He then alluded to the definition of a workman as provided by the Act, and to the absence from the Act of a definition of accident, which, he said, by judicial decisions had been made to cover occurrences quite outside the ordinary meaning of the term, and quoted illustrative cases—Anderson *v.* Balfour, Challis *v.* London and South-Western Railway. He then alluded to the position of medical men as necessary witnesses and medical referees as necessary arbitrators and holders of "facts." He then passed on to the statistics of the Act for the years 1909–10–11, dealing with stupendous figures of workmen's fatalities and claims, the net result of which was that the influence of the Act was spreading wider and wider, and was probably no small factor in the general rise of the cost of living.

MALINGERING.

Sir John Collie then read a paper on malingering, in the course of which he said that downright malingering was rare, but quoted two typical examples from his own experience. He then touched on malingering in women, and said that the poor physique of women and the still poorer standard of living was probably at the bottom of a good deal of so-called malingering amongst women, and should rather be called "previously unsuspected disability." The next class of malingering he touched on consisted of individuals who, under the combined influence of morbid introspection and dishonest legal, and mistaken domestic, advice, remained on the sick list longer than was necessary; and a third class consisted of functional neurasthenics whose previously existing neurasthenia was made more manifest by traumatism. The best and indeed the only correct treatment for the last two classes must, said Sir John, be institutional, which essentially consisted in detachment from the sympathetic environment of injudicious friends, rest in bed, good food, massage, electricity, and, above all, bright and tactful nursing. The curative effect of these was marvellous, and commonly not of very long duration in medium cases.

At the conclusion of these two papers Professor Pappe gave a brief account of the Workmen's Insurance Acts in Germany and of their working. He mentioned one important point wherein German differed from English practice—namely, that the family of an injured German workman received assistance while the workman was laid up.

Professor Strassmann mentioned the case of a man in Berlin who, in order to maintain the fiction of a bruised stomach, swallowed iron nails. The fraud was successful, and only the autopsy gave the clue to his symptoms.

Injuries of the Back.

Mr. Arthur S. Morley then read a paper on injuries of the back from a medico-legal aspect. He first gave a summary of the anatomy of the back from bones and ligaments to cord nerves, muscles, and fasciae, and then detailed the movements of the spine, and how—that is, by what muscles—they are produced.

In making a diagnosis it was necessary first to determine whether the patient was malingering or not; and if it were decided that there was some genuine trouble the next point was to determine the locality and the structures involved—nerve, muscle, bone, etc.; and, lastly, whether the trouble were due to accident or disease. He mentioned several tricks to counter the alleged inability of the malingerers to perform certain movements. He mentioned a striking case of an almost symptomless fracture dislocation of the lumbar spine; he thought that traumatic neurasthenia was rare after spinal injuries, but more common in somewhat trifling head accidents. He emphasized the necessity of accurate diagnosis by reference to the need of it for proper treatment, which, he said, did not consist in prolonged rest, but in a certain amount of this, with due attention to position, followed by an early resort to movement, on the same principles that surgery now applied to sprained joints and fractured long bones.

Deaths under Anaesthetics.

Dr. Spilsbury read a paper on 104 cases of death under anaesthesia. He defined "under anaesthesia" as either during the period of administration or so immediately after as to leave no doubt that the anaesthetic had played some part in the death. With regard to so-called status lymphaticus, he said that he had found it (as described) in 32 cases, but had not found it in 72; out of the 32 cases every single one had revealed either naked-eye or microscopic pathological changes (fatty or brown atrophy) in the heart muscle, and he was therefore compelled to regard defective heart muscle as an essential part of status lymphaticus. From a review of all his cases he was enabled to make the following statements: (1) That the status lymphaticus was only present in a comparatively small proportion of cases. (2) That in a large majority of so-called "deaths under anaesthetics" there was a very grave bodily condition, accident or disease, which had probably played the major rôle in producing death. (3) That degeneration of the heart muscle was the most dangerous condition to be met with in administering anaesthetics. (4) Lastly, and most importantly, that considering that anaesthetics were being administered pretty nearly continuously day in and day out, year in and year out, the numbers of deaths directly due to the anaesthetizing agent constituted an almost negligible proportion of the total number of those who were put under an anaesthetic.

Death Certification.

Dr. J. C. McWalter (Dublin) criticized very adversely the present form of death certificate, showing (1) there need have been no death (case in point quoted); (2) there need have been no recent attendance; (3) that the diagnosis of the cause of death might be, and probably was, wrong in at least 10 per cent. of cases; and that, granting these three points, a fourth followed—namely, that the Registrar-General's reports must contain very fallacious or at least dubious information, so much so as severely to vitiate conclusions drawn from them. He thought that the title of his paper outlined an impossible policy of perfection, but he did suggest arming the profession with judicial authority to proceed to so much of an autopsy as was necessary for more precise decision of the gross and actual cause of death.

VISIT TO BROADMOOR.

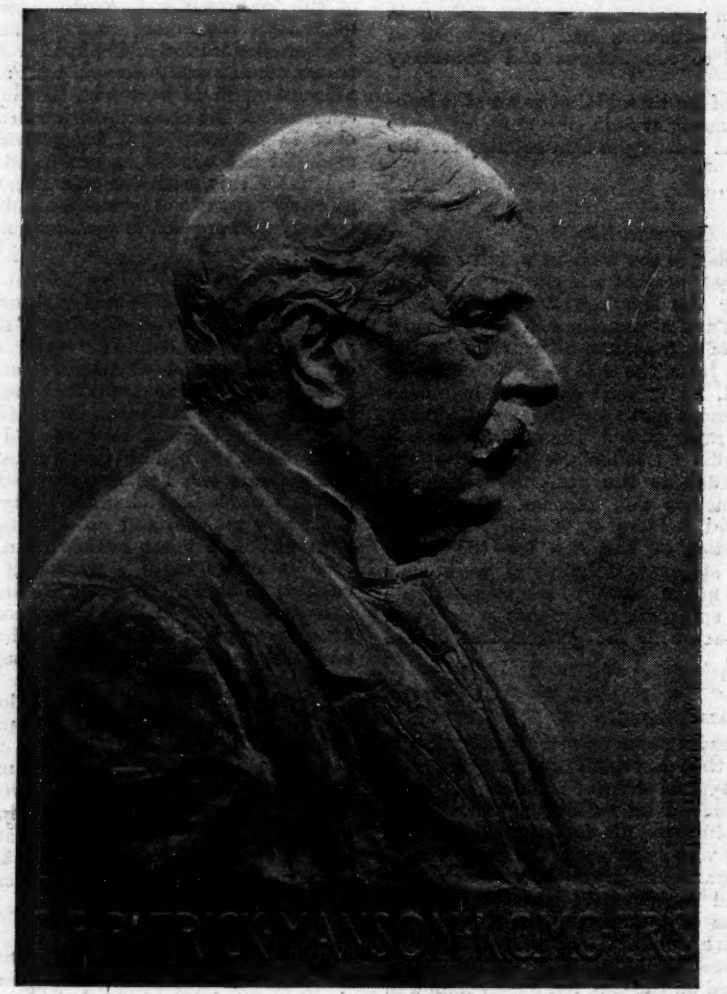
In the afternoon several members paid a visit to Broadmoor Criminal Lunatic Asylum. They were the guests on the journey of the Medico-Legal Society, and at the Asylum of Dr. Baker, the Medical Superintendent.

TROPICAL MEDICINE AND HYGIENE.

International Presentation to Sir Patrick Manson.

Some two years ago Dr. Blanchard, Professor of Medical Natural History and Parasitology in the University of Paris, proposed that an opportunity should be afforded to those specially interested in tropical medicine and hygiene to give to Sir Patrick Manson in some suitable way a testimony of the high esteem for his original scientific work felt in every country where the study of these subjects is pursued. The proposal was warmly taken up, and M. Richer, of Paris, was engaged to prepare a portrait medallion. The occasion of the International Congress of Medicine in London was taken to make the presentation.

At the meeting of the Section of Tropical Medicine and Hygiene, on August 11th, when Sir William Leishman, F.R.S., was in the chair, Professor Blanchard, in the name of the International Committee, presented the medallion in gold to Sir Patrick Manson. The medallion, as will be seen from the photographs here reproduced, bears on the one side a portrait of Sir Patrick Manson and on the other an allegorical group representing Science triumphing over disease in a tropical landscape; the legend below the group runs:



MORBIS INGENIO SUPERATIS
NUNC PERVIAE
ORBIS EXUSTAE PARTES.

[The triumph of genius over disease has opened up the torrid parts of the earth.]

Professor Blanchard delivered an eloquent and stirring address concerning Sir Patrick's contributions to science, which were, he said, well known throughout the whole world; the medallion now presented to him was a tribute of respect by his fellow-workers and admirers, and an emblem of the homage paid to the work of a great man and the father of modern tropical medicine.

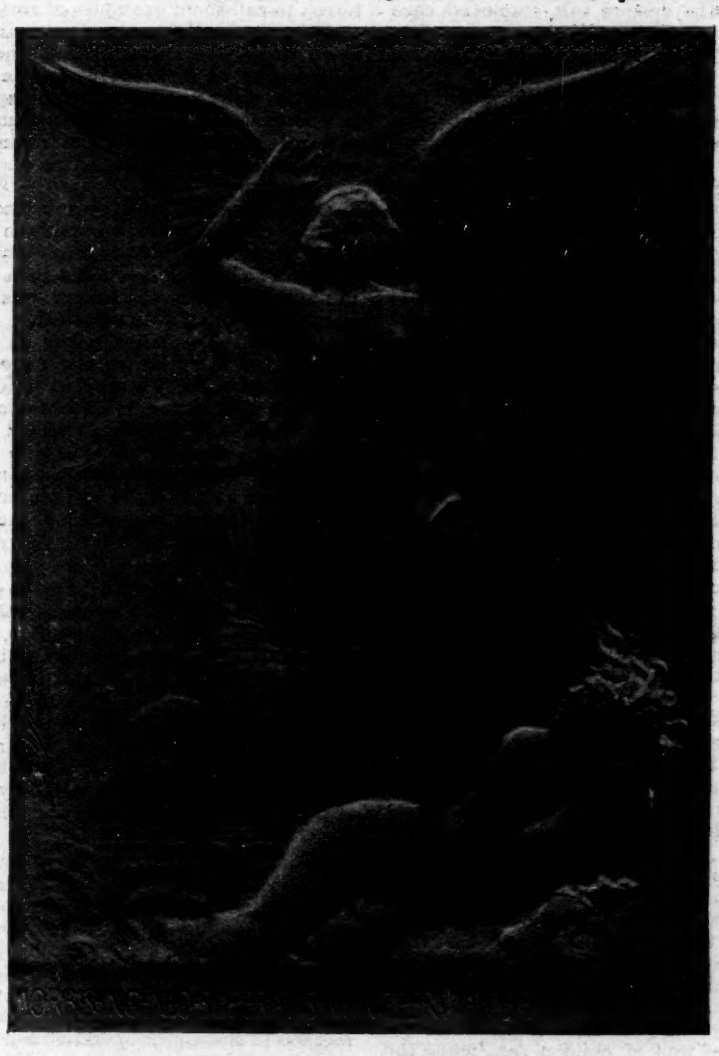
The Section was opened on Thursday morning by the President, Surgeon-General Sir David Bruce, C.B., F.R.S., who gave a cordial welcome to members. He said that at the last Medical Congress held in London in 1881 there was no special section for tropical medicine, and there was only one paper on a tropical subject—that on the prevention of cholera and yellow fever, by Surgeon-General Billings. At that time it was not thought that yellow fever could be conveyed from man to man. Pettenkofer believed that an infected person might become infective provided a certain unknown "something" necessary to the development of the poison existed in a given locality.

Plague.

Professor Dr. S. Kitasato (Japan), in the course of a paper on the value of the search for rat-fleas in the detection of plague, pointed out that the methods of preventing plague varied according as the disease was of the pneumonic or bubonic type. The pneumonic type was best checked by the early discovery of persons suffering from the disease and by the immediate segregation of those who had come in contact with them. The bubonic type, on the other hand, could only be prevented by the discovery and elimination of the plague-infected rats. The theory that the rat and flea were the means by which bubonic plague was spread was established in 1906 by the Indian Plague Commission. This was an extremely practical point, for the discovery of the presence and distribution of the germ in fleas, together with the examination of rats, afforded all the details for laying down an effective plan of prevention. The best way of capturing rat-fleas and inspecting plague houses or localities was to allow guinea-pigs to run free in them, because these animals were susceptible to plague and readily harboured rat-fleas. After they had thus been exposed for twenty-four hours the fleas upon them could be collected and examined, and proof obtained of the presence and intensity of infection or the opposite. Disinfection, however thorough, could only destroy the plague germ itself; it had no effect upon the flea. The rats must be destroyed in any abode before it could be pronounced plague free, and it must be rendered rat-proof if it was to be maintained free from plague in any district where the disease was rife. Disinfection in plague must be insecticidal as well as germicidal. Kitasato summed up the results of experiments by stating that the presence of the plague germ might most satisfactorily be established by the guinea-pig test, and by the continued bacteriological examination of rats. Major W. Glen Liston, C.I.E., I.M.S., Senior Member Plague Research Commission, read a paper on the epidemiological features of bubonic and pneumonic plague contrasted. Ever since Childe in 1897 found plague bacilli in the sputum of patients suffering from plague bacilli there had been frequent outbreaks of this form of the disease. It had been wellnigh conclusively shown that bubonic plague could be conveyed to man only by infected fleas from plague-infected rats, and that pneumonic plague could be transmitted from man to man directly through the sputum of infected persons. Fortunately the bacillus did not long remain a potential source of infection outside the body of a living animal or insect. An epidemic of pneumonic plague could be more readily controlled by the isolation of infected persons than an epidemic of bubonic plague where rats and then fleas were the disseminators of the disease. Major Liston dealt also with the immunity of *Mus rattus* to plague infection. He showed that the decreasing severity of epidemics in a particular town which had suffered from repeated outbreaks of plague was due to the evolution, by a process of selection and survival of the fittest, of a race of rats comparatively immune to plague, and that such a place might remain, for a time at least, free from epidemics of bubonic plague. Recent experiments showed that these conclusions apply to *Mus rattus* and not to *Mus decumanus*. Dr,

Wu Lien Teh, M.D.Cantab., Director of the Chinese Medical Service (Harben), reported the result of investigations into the relationship of the tarbagan, or Mongolian marmot, to plague. Dr. Wu dissipated the belief once so firmly held that the tarbagan (*Arctomys bobac*, Shreb) was the alternative host of the plague bacillus, and that in fact in Manchuria the marmot took the place of the rat as the carrier of plague. So firmly was the belief held for a time that the tarbagan was the cause of the outbreak of plague in Manchuria that the hunting of the animal for its fur was forbidden both by the Russians and Chinese. An expedition, headed by Dr. Wu, sent to investigate the matter, showed that although the tarbagan occasionally suffered from plague, its direct relationship to human plague might be considered negligible.

Professor C. J. Martin, F.R.S., and Mr. A. Bacot (Lister Institute, London) gave an account, illustrated by lantern slides, of the mechanism of transmission of plague by fleas. What Professor Martin termed "choked fleas"—namely, fleas whose intestine became blocked by clotted blood so that there was no faecal excretion—were very active, biting again and again, and to them he ascribed the power of transmitting disease to animals. Plague, he stated, was not a disease of the tropics, but existed in regions where a spell of cold weather prevailed. Why the disease did not prevail in the tropics was probably due to the fact that the fleas were dried up quickly in hot, dry weather.



Mr. James Cantlie (London) said that it was interesting to note that the belief once held, that the tarbagan was a plague carrier, seemed to be refuted by Dr. Wu's experiences in Manchuria, but it must be noted that in America the ground squirrel—an animal closely allied to the tarbagan—was considered an active agent in transmitting plague. Professor Martin's view that the dry heat of the tropics destroyed fleas seemed scarcely in accord with the seasonal occurrences of plague. Hong Kong and Bombay had similar seasons, but the disease occurred in the former in the moist heat of April, May, and June, whereas in Bombay the recurrences of plague commenced in October and died down in April.

Dr. Duncan Whyte (China) also joined in the discussion.

Enteric Fever in India.

Captain Chambers, I.M.S., read a paper upon enteric fever in India, with special reference to its occurrence in the Indian army. It was, he said, now known that enteric fever was common amongst natives of India, and that the mortality was higher amongst them than amongst Europeans either in tropical or temperate climates. Malarial and typhoid infections might coexist. The most valuable method of diagnosis in enteric fever was the early use of the method of blood culture.

Cholera Vibrios.

Professor van Loghem (Amsterdam), in a paper on the differences between vibrio cholera and vibrio El Tor, showed by lantern slides the essential differences between these vibrios in cultures, the chief being that there is no haemo-digestion in cholera in agar cultures, and that the cholera organism liquefies gelatine; in vibrio El Tor the opposite obtains.

Demonstration.

Dr. da Rocha Lima (Hamburg) gave an interesting account of pathological and anatomical conditions in several tropical ailments, and showed lantern slides of goundon, kala-azar, yellow fever, blackwater fever, blastomycosis, etc.

Tropical Colonization.

Professor Tschudnowsky (Paris) discussed acclimatization in the tropics and the possibilities of white people continuing virile beyond a generation or two.

Visit to the London School of Tropical Medicine.

A large number of members of the Section visited the London School of Tropical Medicine on Friday, August 8th. The new buildings were thrown open for inspection, and special demonstrations were given by Dr. Rost on leprosy, by Professor Alcock, C.B., on entomology, by Dr. P. Bahr on filariasis, by Dr. Low on general tropical pathology, by Dr. Leiper on helminthology, by Colonel King on yaws and plague, and by Dr. Wasielewski on staining *Amoeba limax*. In addition, Mr. James Cantlie explained his method of operating upon the liver, and Professor Sandwith gave clinical demonstrations in the wards of the hospital. Amongst those present were Professor Nocht of Hamburg, Professor Blanchard and Professor Laveran of Paris, Sir Patrick Manson, and Professor Nuttall, together with the members of the staff of the Tropical School.

RADIOLOGY.

Radiography of the Stomach and Intestines.

Two exhaustive reports on the radiography of the stomach and intestines were available for discussion at the morning session, on Thursday, but unfortunately both authors, Dr. C. Lester Leonard of Philadelphia, and Dr. G. Holzknecht of Vienna, were prevented from being present by reason of illness. This was particularly lamentable in the case of Dr. Leonard—the sage of American roentgenology, as one of his compatriots called him—for the reason that his illness was due to the effects of over-exposure to

the rays. It was felt worthy of chronicling as another instance of heroic devotion to medical science that he should have deferred undergoing a necessary operation for six weeks in order that he might complete his report to the Section, which was read in his absence by Dr. H. K. Pancoast, also of Philadelphia.

The technique of the opaque meal in gastric and intestinal examinations figured largely in both reports. Dr. Leonard urged the special suitability, on scientific grounds, of the oxychloride of bismuth, although pure barium sulphate offered a more economical substitute for routine administration. Oatmeal porridge commended itself to him as the most suitable medium for the opaque meal, but he suggested, as did also Dr. A. F. Hertz in the subsequent discussion, that a standard opaque meal should be established, and that if possible the standard should be made international. Dr. Holzknecht made the point that if barium sulphate were the opaque salt employed, care should be taken to obtain the chemically pure preparation (*chemice purissimum, ad usum internum*), other barium salts being injurious.

Several radiologists expressed decided views on this question. Dr. Lewis G. Cole, of New York, pointed out that an artificial precipitate of barium sulphate was much more flocculent than many of the chemically pure products, and therefore was held more readily in suspension. In his judgement the more usual media, such as porridge and bread and milk, did not allow a sufficiently fine suspension of the salt to give the detail necessary for the differential diagnosis of gastric and duodenal lesions, and, on the other hand, were more rapidly digested than a regular meal, and failed to give an accurate index of the motor efficiency of the stomach. His preference was for thick buttermilk, as this allowed the bismuth or other salt to pass into the crevices and between the rugae, thereby affording the necessary detail in the picture; this should by followed by a regular meal, in order to determine the motor efficiency. Perhaps the point of chief practical interest was contributed by Dr. A. Howard Pirie, of Montreal, who described a simple procedure for removing the chemical taste of the barium sulphate as well as the grit usually present, and any soluble poison which might be accidentally involved in the barium preparation. Placing about 10 pounds of barium sulphate in an earthenware pot, he mixed it with a gallon of very hot water. After a period of twelve or twenty-four hours the mixture settled with the grit at the bottom of the pot, above the grit a fine mud, and above this again clear water. The clear water was poured off, and the topmost layer of fine mud was used for the day's work. At the end of the day the mixture was prepared again in the same manner for the following day's use. Dr. Pirie claimed that this procedure removed from the meal at once its possibilities of danger and also its unpalatableness, for the barium could then be mixed with milk in such a manner that the patient was unable to recognize it.

Many interesting points in connexion with the intestinal movements were brought out in the reports. Dr. Holzknecht drew special attention to the largeness of the movement with which the greater part of the food normally passed along the colon—a phenomenon seen at its best when a regular meal was given some hours after the bismuth or barium repast. Both reporters referred to the radio-cinematographic method of illustrating the process of digestion. Dr. Leonard was of opinion that while the movements within the alimentary canal could be most effectively studied by means of bio-roentgenograms, the apparatus was too expensive to allow it to become of general service at present. Expense notwithstanding, roentgenography already owed to this method knowledge which could be obtained in no other manner. The study of the peristaltic waves of the stomach by laying the cinematographic principle under tribute had elucidated the sequence of the movements and shown the variation in depth during the passage of the waves down the stomach.

SERIAL RADIOGRAPHY.

A demonstration of one method of radio-cinematography was given on Thursday afternoon by Dr. Lewis G. Cole. The film he projected was certainly remarkable, as it showed plainly the phenomena of stomach evacuation. The immediate purpose of Dr. Cole's communication was to illustrate some points in the diagnosis of duodenal or, as he preferred to call it, post-pyloric ulcer. The differential diagnosis of ulcer in the first or ascending portion of the duodenum, or the cap of the stomach, from malignant gastric conditions formed, in Dr. Cole's words, "one of the firing lines of surgical advance." The method of diagnosing post-pyloric ulcer which he had employed in 500 cases was based on the recognition by the cinematographic method of a constant deformity of the cap or sphincter, caused by the induration or cicatrical contraction surrounding the crater of the ulcer. This could be recognized, he said, by studying individually and collectively a large number of plates, and either matching them over each other, or preferably reproducing them on the cinematograph film. Although he had obtained the perfect illusion of movement, Dr. Cole hesitated to apply the term "cinematographic" to such reproductions, but he preferred to call them examples of serial radiography, and he considered that from the diagnostic point of view much more was to be learnt from a number of instantaneous radiographs of different phases in different cycles than from the same number of radiographs of different phases in one cycle, as in the direct, continuous cinematograph picture. He described serial radiography as the "most active scout" in the detection of ulcers of the stomach cap.

Another radio-cinematograph record of the stomach, the result of instantaneous exposures made at the rate of rather more than one per second, was shown by Dr. A. H. Pirie. The motions on the screen were more rapid than in nature, of course, but there was sufficient sequence to suggest the value of the method.

Dr. Pirie also read a paper on a correlated subject—namely, the variation in the appearance of the normal stomach as seen by *x* rays, in which he pointed out the importance of examining the whole of the intestinal tract, as symptoms which were referred to the stomach might arise from other causes. In one instance the stomach symptoms disappeared after the removal of the appendix, which had retained the barium for as long as forty-three days after the administration of the meal.

EXAMINATIONS FOR STONE.

Another application of the *x* rays in diagnosis was illustrated by Mr. C. Thurstan Holland's statistical paper on *x*-ray examinations for stone. The total number of such cases which had come under his care during the past eight years was 1,707, and of these 104 were for bladder examination only. He gave some useful figures showing the proportion of occurrences of pelvic shadows, calcareous glands and arteries, deformities, and so forth. Calculi were found in males in 276 cases out of 985 examined, and in females in 126 out of 618. His youngest case was a boy of 5 years, in whose kidney six stones were found.

POST-OPERATIVE TREATMENT OF MAMMARY CANCER.

The remaining paper on the day's programme was on a radio-therapeutic subject—namely, the treatment of recurrences and metastases from carcinoma of the breast. The author, Dr. George E. Pfahler, Professor of Roentgenology in the Medico-Chirurgical College of Philadelphia, admitted that his success was only partial, but nevertheless *x*-ray treatment was more promising than any other method in these post-operative conditions. His procedure was to apply *x* rays as promptly and as vigorously and from as many directions as possible, and to carry the dose to the limit of skin toleration after filtering. The distinctive feature of the method, however, was the combination of *x*-ray applications with small doses of thyroid extract. Usually he began with the administration of one half-grain of thyroid extract three times a day after meals, increased every four days by one half-grain in the daily dose until the patient was taking 1½ grains three times a day. Dr. Pfahler believed that his results were improved to a considerable extent by the addition of this preparation to the purely *x*-ray treatment. Dr. N. S. Finzi, speaking on this paper, said that in cases of metastatic carcinoma *x*-ray treatment not only might be used, but ought to be used, as, except in a few cases, it was the only method available. When, however, there was a solitary small nodule of recurrence, and no evidence of any further disease, he preferred to use the filtered rays of radium.

Tuberculosis.

Radiography of the Chest.

The Section was particularly happy in its choice of openers in the important discussion on the radiography of the chest on Friday. Both Dr. Hugh Walsham, of London, and Professor K. F. Wenckebach, of Strassburg, combined the parts of radiologist and clinician, and, as a subsequent speaker said, both of them, the one in England and the other in Germany, helped to lay the foundations of scientific chest radiography. Dr. Walsham said that he had made his first chest radiograph as long ago as 1896, and he prophesied then—a prophecy which he had seen no reason to retract—that x rays would become a very effectual means for the diagnosis of chest disease. Indeed, he would go so far as to say that no chest had been completely examined unless x rays had been used. His paper took the form of a catechism. What was the value of Williams's sign—that is, the limitation of the excursion of the diaphragm on the affected side in the early cases of pulmonary tuberculosis? He had seen this diminished movement in some early cases, but not in all. What was the value of the deficient illumination of one or other apex as seen by the screen? He was not disposed to place much emphasis upon the value of that appearance. Could x rays detect pulmonary tubercle before the usual physical methods at the physician's disposal? Personally he thought that they could, and he quoted an aphorism by his late revered teacher, Dr. Gee, to the effect that in any case of phthisis the disease was more extensive than the physical signs would seem to indicate. Again and again he had found the x-ray picture reveal a disease much more extensive than he had supposed by stethoscopic examination. What was the value of the obliteration of the pleuro-pericardial angle as an early sign of pericarditis with effusion? Occasionally he had found this sign very valuable in the differential diagnosis of this condition and of a subphrenic abscess. With regard to aneurysms of the aorta, was it always possible to diagnose by x rays between an aneurysm and a mediastinal new growth? He thought that this was an impossibility. To what extent was pulsation of assistance? According to his own observations, not a great deal. Or the shape of the shadow? Again according to his own observations, scarcely at all. Aneurysms and mediastinal new growths might take any shape. On two occasions x rays had helped him in the diagnosis of cardiac aneurysms, and he found the shape of the heart's shadow useful sometimes in the diagnosis of valvular and congenital disease.

If Dr. Walsham's interesting communication was in the nature of a sketch, Professor Wenckebach's was a filled-in picture. His detailed survey, however, was confined almost entirely to the consideration of the lung shadows. With regard to technique, he laid emphasis upon the great importance of the stereoscopic method in lung examination, and also upon the value of what he called "die Moment-photographie," or the radiography of the chest within the fraction of a second while the breath was held. The instantaneous radiograph obtained by means of specially powerful x-ray apparatus had revolutionized the methods of chest examination, and had brought nearer than before the prompt diagnosis of early tuberculosis. He proceeded to review, first the Roentgen picture of the healthy lung, and then the general pathological changes in the lungs as seen radiologically, the special diagnostic indications for bronchitic affections, for pulmonary inflammations, for tuberculosis, and for pleuritic processes. Two interesting points were specially worthy of record. One was the professor's strong contention that the presence of emphysema did not render a person immune from tuberculosis; and the other his statement that the radiating lines from the roots of the lung, especially on the right side near the base, were not entirely due to bronchi, some of them being due to vessels. Williams's sign, he believed, was not always present in early tuberculosis, and when present its single evidence was not sufficient to justify a definite diagnosis, but when its presence was established beyond doubt it might generally be taken to indicate a tuberculous invasion.

The discussion for the most part centred around the question of radiographic technique. Dr. Alban Kohler of Wiesbaden and Dr. Fedor Haenisch of Hamburg were of opinion that the intensifying screen was unsuitable for chest radiography, because it blurred the fine detail in the lung structure, upon which everything turned. Dr. Béclère of Paris and Dr. G. Harrison Orton of London dwelt upon the extreme importance of remaining in darkness or semidarkness for some time before attempting to make screen examinations, and the latter also insisted upon the need for a tube of very low penetration and its adjustment so that the suspected side was barely illuminated. The President (Sir James Mackenzie Davidson) urged the use of the stereoscopic method in chest radiography, and Dr. N. S. Finzi was of opinion that underexposure was the most fruitful source of loss of detail. The latter always made his own exposures in the same period of the respiratory cycle—namely, deep inspiration—using the tube as soft as possible and with as small a diaphragm. By using these methods he had found that a modern apparatus enabled one to get a chest radiograph sufficiently exposed in about a quarter of a second. Several speakers mentioned the value of precautionary x-ray examination. Dr. Francis Williams of Boston, U.S.A., suggested that this examination should be made in the case of every member of the family of a tuberculous patient. So much impressed was he with the importance of a precautionary examination that about a year ago he suggested to the staff of his hospital that they should ask the trustees to establish a clinic for this purpose. This project had materialized, and the work which had gone forward during the last twelve months made it plain that the universal establishment of such clinics would prove of inestimable value. Another instance of precautionary measures—on this occasion in Paris—was mentioned by Dr. Ledoux-Lebard of that city. During the past eighteen months, he said, he had examined radiologically the chests of all patients who were about to be operated upon by Dr. Gosset, no matter what the degree of severity of the projected operation. In more than 20 cases, owing to the fact that the screen had shown a doubtful condition of heart or lungs, the operation was abandoned, and in other cases, in which the surgical procedure was absolutely imperative, an unfavourable radiological opinion had proved to be justified by the death of the patient subsequently to the operation.

Several papers on associated subjects were read at the afternoon sitting of the Section. Speaking from the standpoint of the physician, Dr. Sydney A. Owen, of London, passed in review the evidence afforded by a large number of cases as to the early detection of tuberculosis of the lungs by means of x rays. He expressed the more conservative conclusion that the systematic use of x rays should be an additional method of physical diagnosis in the early detection of tuberculosis of the lungs where, by the usual methods of examination, it was impossible for the competent physician to arrive at an early, immediate, and definite diagnosis. Another paper, this time on the radiological diagnosis of thoracic affections in children, was read by two medical men of Nice, Drs. d'Oelsnitz and Paschetta. Systematic radiological exploration of the thorax, they claimed, was most valuable in a series of bronchial and other conditions with which they dealt in turn; sometimes the x-ray picture sufficed for the diagnosis, frequently rectified it, and always made it precise and complete. Speaking on this paper, Dr. J. S. Hirsch, of New York, expressed the view that the radiological examination of chests of infants with meningeal symptoms would frequently disclose evidence differentiating the tuberculous from other forms of meningitis.

Kidney.

The technique of Roentgen diagnosis in tuberculosis of the kidney was the subject of a brief note by Dr. Alban Kohler, and the remaining papers dealt with the x rays from the very different standpoint of a therapeutic agent in tuberculous affections.

Radiotherapy.

Drs. Auguste Broca and W. Mahar described the application of radiotherapy to more than 200 cases of localized tuberculosis in the Paris Hospital for Children. The results were favourable, particularly in tuberculosis of the skin, including lupus. In most of the affections—the tuberculous adenopathies representing the chief exception—the x-ray doses employed were feeble, apparently about one-third of the epilation dose, and the authors considered

that strong doses paralysed the processes of repair. The high percentage of good results was explained on the double ground of a destructive action on the tuberculous cells, and an exciting action on the cells of the neighbouring healthy tissue. Dr. Albert-Weil, of Paris, confirmed this particular *x*-ray application by instancing some of his own cases, and went on to say that even pulmonary tuberculosis would respond to the employment of *x* rays heavily filtered. This last suggestion was more fully dealt with in a paper by Dr. L. Küpferle, of Freiburg, who described some experimental studies in the treatment of pulmonary tuberculosis. The first experiments related to rabbits, and the author said that in these animals tuberculosis could be influenced by means of *x* rays, not only at the beginning of its evolution, but at the period of its full development. The effect on applying a hard radiation consisted in the destruction of the tuberculous proliferation tissue. A direct influence upon tubercle bacilli could not as yet be certainly made out by vaccination experiments, but investigations in this direction were proceeding. The irradiation of consumptive people, fifteen in number, had also been undertaken, and it was stated that favourable results were obtained in the first and second phases of the disease (with moderate fever and expectoration) by the application of not too small doses of hard rays. The clinical effects consisted of a slow decrease of temperature, a reduction of cough and expectoration, and an improvement of the general condition.

Dr. Leon Tixier of Mentone described his method of combining heliotherapy and radiotherapy in the treatment of chronic tuberculous adenitis. He had found the sun-baths given on the Riviera a valuable adjunct to *x* rays, particularly in the softening form of tuberculous adenitis with a tendency to suppuration. Three months was the time said to be sufficient for the cure.

Demonstration.

The proceedings of the day concluded with a lantern demonstration by Drs. Potocki, Delherm, and Laquerrière illustrating the radiographic images obtained of the fetus. It was stated that, with the aid of intensifying screens, quite visible silhouettes were forthcoming at the sixth and seventh month, and in some cases at the fifth.

HISTORY OF MEDICINE.

A GLANCE at the transactions of the last International Medical Congress which met in London (1881) shows that, although there was no section dealing with the History of Medicine, yet the reader of nearly every paper dealt with the history of the subject to which his paper referred. The first attempt to form a History Section was at the Congress held in Rome in 1894, and concerning it we observed at that time that "an additional section which is likely to prove of exceptional interest will comprise an exhibition of antique objects of medical and surgical interest from prehistoric times to the eighteenth century." No literary section, however, dealing with medical archaeology has been formed until this Congress in London. Any doubts which the organizers of the present Congress are said to have held as to the utility of such a section will be removed by the number—some sixty—and the value of the papers presented, and by the attendance—averaging seventy—of members attending each session.

The meetings, held in the library of the Royal College of Physicians, were presided over by Dr. Norman Moore.

At the first meeting (August 7th) Dr. Moore delivered an admirable inaugural address, dealing principally with the life of Dr. John Freind, the first English writer upon medical history. Dr. Freind, the President observed, wrote his famous History under adverse conditions. He was imprisoned in the Tower of London on a baseless political charge; he was unable to get proper access to the necessary literature, and a warder was always present in his cell. The President then proceeded to deal with other medical historians, among them Baldwin Hamey, Aiken, and Munk.

The honour of reading the first paper was awarded to the only lady member of the section, Miss F. M. Stawell (London), whose paper on Saint Luke and Vergil was designed to show that St. Luke was a Roman, not a Greek, and that his writings were much influenced by Vergil's *Aeneid*. Miss Stawell's discourse was listened to with marked interest, not only on account of its intrinsic merit but also on account of its perfect English diction and its euphonious quotations in Roman Latin and Hellenic Greek.

Miss Stawell was followed by Professor Caton (Liverpool), who read a highly valuable paper upon the temples, hospital, and medical school of Cos, showing that the hospital is not a purely Christian institution, as sometimes stated.

Among other papers during the first day was one by Professor Sudhoff (Leipzig) upon the origin of syphilis; its object was to prove that syphilis did not arise in the Middle Ages, as commonly supposed, but was practically coeval with civilization itself.

Dr. Sudhoff was followed by Professor Sticker (Bonn), who read a paper on leprosy in the Middle Ages; by Dr. Rivers (Cambridge), who contributed a paper on massage in Melanesia; and by Dr. Walsh (New York), who gave a humorous address on some historical questions in the light of our modern knowledge, intended to show that time and research had produced little change in diseases or in their treatment.

Other papers of great interest were: The influence of Pythagoras in Greek medicine, by Dr. Moon (London); painting in relation to the history of medicine, by Professor Corsini (Florence), read in his absence by Dr. Capparoni; girdles, their use in obstetric practice, by Dr. Dilling (Aberdeen); engraving in colours illustrating medical history to the end of the seventeenth century, by Dr. Lebard; some unpublished drawings by Sir Charles Bell, by Dr. Corson (United States); and Saint Antony's fire, by Dr. Chavant (Grenoble).

The first day's work was brought to a close by Mr. D'Arcy Power, who dealt with the less known works of John Arderne, the character and number of which must have come as a surprise to those whose acquaintance with Arderne's writings was limited to a knowledge of his well-known work on fistula.

On the second day of the session (August 8th) Professor Sudhoff returned to the rostrum with a paper on the antique representation of the human body, and expressed the view that pictorial representation of the human body, which arose, he stated, in Alexandria, spread westward only because of the Oriental prohibition against making graven images. Dr. Sudhoff was followed by Dr. Holländer with a paper on the relations between art and the history of medicine.

Then followed two interesting papers on the death of Napoleon—the first by Dr. Chaplin (London), based upon the *post-mortem* examination, in which he summarized his reasons, more fully set out in his recent book on the subject, for believing that the Emperor suffered from hepatitis and from carcinoma of the stomach; the second by Dr. Guthrie (London), who advanced the view that Napoleon was the subject of hypopituitarism.

The papers which followed were: The history of Alpenstick, by Professor Sticker (Bonn); Italian medicine in the Middle Ages and to-day, by Professor Barduzzi; a paper by Mr. Wellcome dealing with his excavations in the Soudan, and giving evidence that midwifery forceps were in use 150 years B.C., a discovery which would have astonished Peter Chamberlen; a paper by Dr. Ray containing evidence that the Ancient Egyptians had suffered from syphilis, a suggestion which met with the approval of Dr. Sudhoff; an account by Dr. Capparoni (Rome) of inscriptions in the catacombs of Rome to physicians from the second to the ninth century; and a paper by Dr. Barbour (Edinburgh) upon Soranus, who flourished in Rome during the reigns of Hadrian and Trajan, and was, Dr. Barbour considered, the pioneer of scientific midwifery.

The second day's sitting was brought to a close by an admirable paper by Dr. Parker on the barber-surgeons, their history and power, a sort of pocket Sydney Young, but amplified to include the guilds in foreign countries.

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SATURDAY, AUGUST 16TH, 1913.

International Medical Congress.

THE ADDRESS IN SURGERY.

PROFESSOR HARVEY CUSHING'S Address in Surgery, which was published in the BRITISH MEDICAL JOURNAL of August 9th, covered so vast a field that it is impossible here to discuss the many questions which it raised. We must therefore confine our attention to some of the salient points. Instead of reviewing the progress of surgery during the thirty-two years that have elapsed since the Congress last met in London, or tracing the evolution of brain surgery in which he has played a prominent part, the orator made a bolder flight around the whole domain of medicine. Taking his hearers with him as on an intellectual aeroplane, he showed them the changes in the relations of medicine and surgery, and the subdivisions of these great departments of science which have been brought about since 1881. Huxley, Virchow, Pasteur, Lister, and Koch, all of whom took an active part in the work of the Congress held in that year, laid the foundations of a new temple of science, and the additions to the edifice during the past generation that have transformed it into the magnificent structure we now see, have been made by following the methods of investigation which medical science owes to these men. Of these methods, the principal, Professor Cushing said, was experiment on living animals.

To the restrictions placed on such research by the Act of 1876 he attributed the fact that, while this country has remained in the forefront in those of the experimental sciences which are not hampered by legislative restriction, comparatively few men have followed in the footsteps of John Hunter and Cheselden, Charles Bell and Lister, who enlarged the boundaries of the science while improving the craft of surgery. It is surely a strange irony of legislation that a measure intended chiefly to check physiological research has hindered investigation in the fields of practical medicine and surgery, while the pure physiologist, who has had to work with police gyves upon his wrists, has done most for the advancement of medicine, especially in the province of neurology, in this country during the last three decades. There could be no more striking proof of the mischievous nature of an agitation which, while failing to restrain purely scientific research, tends to hamper investigations that are of direct benefit to mankind. It would be a truism to say that the seeker after new truth should be encouraged rather than opposed and decried were it not that politicians see no votes in experimental research, while the people cannot appreciate its value. The indifference arising out of this ignorance may be a far more formidable obstacle to scientific progress than the ravings of fanatics. William Pitt, when asked to bestow a pension on some deserving writer, said, "Literature can take care of itself." This is the attitude of most statesmen towards science Hence a Government the breath of whose life is the *popularis aura* may at any time in its struggle for existence be driven, by the clamour of a few noisy agitators, to impose restrictions on research which the great body of the people is too indifferent to resist. It is well, therefore, that the practical value of research should be brought home to the public mind.

Professor Cushing referred in passing to the fact that the money results of Pasteur's work in various important industries enabled France to pay off the heavy indemnity imposed upon her after the great war of 1870-71. But Pasteur did far more than this. Writing to the Lord Mayor of London in 1889 Huxley says: "The path of M. Pasteur's investigations is strewed with gifts of vast monetary value to the silk trades, the brewer, and the wine merchant. . . . But there is much more to be said. M. Pasteur's direct and indirect contributions to our knowledge of the causes of diseased states, and of the means of preventing their recurrence, are not measurable by money values, but by those of healthy life and diminished suffering to men. Medicine, surgery, and hygiene have all been powerfully affected by M. Pasteur's work, which has culminated in his method of treating hydrophobia. I cannot conceive that any competently instructed person can consider M. Pasteur's labours in this direction without arriving at the conclusion that if any man has earned the praise and honour of his fellows he has." Speaking of the opposition organized by the antivivisectionists against the proposal to contribute to the support of the Pasteur Institute, Huxley went on to say that for the most part it had nothing to do either with M. Pasteur's merits or with the efficacy of his method of treating hydrophobia. "It proceeds partly from the fanatics of *laissez faire* who think it better to rot and die than to be kept whole and lively by State interference; partly from the blind opponents of properly conducted physiological experimentation, who prefer that men should suffer than rabbits or dogs; and partly from those who for other but not less powerful motives hate everything which contributes to prove the value of strictly scientific methods of inquiry in all those questions which affect the welfare of society." *

Professor Cushing, referring to the fact that the Congress of 1913 has met, as in 1881, not long after a public inquiry as to experiments on animals, called attention to the new evidence that had been obtained as to the value of vivisection. The Royal Commission revealed the transformation which in thirty years had taken place in medical science as a direct result of the very methods of research the Commissioners were called upon to investigate. It is needless to follow Professor Cushing through all the points of his vindication of experimental medicine; they are all familiar to readers of the BRITISH MEDICAL JOURNAL. Spoken from so conspicuous a platform and so widely published in the press, they will doubtless carry conviction to many who would not otherwise be reached. Lord Morley, indeed, spoke in a tone of sentimentalism on the subject, and quoted Bacon in his support; he seemed to have forgotten that the author of the treatise *De Augmentis Scientiarum* expressed approval of "the dissection of beasts alive" for purposes of scientific inquiry. But, as Sir Thomas Barlow said, already there is gratifying proof that public opinion has been awakened to the necessity of experiment if medicine is to advance,

* *Life and Letters of Thomas Henry Huxley.* By his son Leonard Huxley. London, 1900, vol. ii, p. 239.

and a resolution, proposed by Sir Edward Schäfer, President of the Section of Physiology, and unanimously adopted by the Congress at its last general session, may be taken as a declaration of faith in the necessity of vivisection by the representatives of medical science throughout the world.

One of the most marked changes, or "realinements," to use Professor Cushing's expression, which have occurred is that medicine, which used to be something of a mystery veiled from the eyes of the profane, is no longer confined to the privacy of the consulting room or to the seclusion of the hospital. It has come forth into the light of day, and works for the public weal under the eyes of the people. The increased efficiency which is the fruit of experimental research has aroused a keen interest in its progress in the public mind. This is well illustrated by the large amount of space given to the proceedings of the Congress by the leading daily papers. The profession is no longer alone in fighting disease; the active co-operation of the public is being more and more enlisted. Lay organizations of various kinds, corporations, and Governments, all now take an active part in the struggle. There are still, it must be admitted, many who, like Lord Harberton and Mr. Bernard Shaw, see in the doctor nothing more than a hunter for fees. How do such cheap cynics explain the paradox that the medical profession has persistently striven to make of the world a place where there is constantly lessening need for the medical man? As Dr. Cushing puts it, "Dr. Pound, of Cure Lane, is being superseded by his young disciple, Dr. Ounce, of Prevention Street." It is well that it should be so; but it should be understood that progress in hygiene means an ever-increasing financial loss to the doctor. Vaccination alone must have saved the people and the State many millions of pounds.

Another "realinement" is seen in the transformation of the military surgeon of to-day into a physician more busy with preventive inoculation and the protection of water supplies than with the extraction of bullets or the use of the scalpel and ligature. Naturally, in time of peace the medical officer has little to do with surgery, but in time of war it is otherwise. We have not forgotten how the outbreak of the South African war was followed by an outcry of fond mothers and anxious wives that surgeons of the highest eminence should be sent to the front to do work which properly belongs to the army surgeon, and is performed by him with perfect competence. Moreover, the military surgeons of a past day were not so indifferent to hygiene as might be gathered from Professor Cushing's statement. If the name of Larrey suggests the amputating knife, that of Desgenettes is associated with his great success in the treatment of plague in Egypt. Both belonged to a *corps sanitaire*.

The greatest change in medicine is due to the influence upon it that has been caused by the vast expansion of surgery. From Lister and Pasteur, said the orator, the great streams of progress have flowed, in the case of the individual into the art of surgery, and in the case of the community into prophylaxis. The principal professional equipment of the surgeon of a generation ago was a knowledge of descriptive anatomy and deftness of hand in operating. Now it is the experimental laboratory rather than the dissecting-room that is his training ground. There is no longer any occasion for the theatrical displays of our younger days, and this alone suffices to remove a temptation which the older surgeons did not always successfully resist—the performance of feats of surgical artistry for the sake of the art rather than of the patient. Nowadays surgeons know more of medicine than they did, while on the other hand, as Professor Cushing says, medicine has become to a large extent "surgicalized." The patient toil of the physician has paved the way for the entrance of the surgeon into parts of the temple of life into which a generation ago he did not dare to penetrate. The physician, according to Professor Cushing, now does his own surgery though not with his own hands. As he becomes more and more a craftsman by the use of instruments of precision, internal medicine and surgery are brought nearer together and tend to overlap as they have not done since the thirteenth century. We join with Sir Thomas Barlow in expressing the hope that one outcome of the Congress may be that the old jealousy between surgery and medicine will be buried for ever. To this desirable consummation Professor Cushing's large-minded address will powerfully contribute. It is only fair, however, to recall that the case for the annulment of the arbitrary divorce between medicine and surgery has already been brilliantly argued by Sir Clifford Allbutt.*

Dealing with specialism, Professor Cushing insists that there should be a long apprenticeship before specialization is undertaken; in this view the profession is entirely with him. He takes occasion to hint that the general surgeon himself is not altogether exempt from the frailties of the specialist; being often a creature of habit he does not care to look outside his own hospital, and regards any innovation with suspicion. There is no doubt that to surgery and medicine, as to everything else, we may apply the words of Keble:

> Each in his hidden sphere of joy or woe
> Our hermit spirits dwell.

To be thus self-contained is inevitably to be narrow. The remedy is to see what workers in the same field are doing and how they do it. Professor Cushing tells us that some years ago a group of surgeons in the United States formed themselves into a society which at stated intervals visits in turn the hospitals, laboratories, and classrooms of the six or eight important medical centres represented in their organization. This system, which cannot fail to broaden the professional outlook and to raise the level of work, has also been adopted in this country. Quite recently the surgical staffs of some of the hospitals both in the provinces and in London have established a system of what may be called exchange visits.

Another "realinement" is the result of the establishment of special laboratories of surgical research, or as Professor Cushing prefers to call it, "experimental medicine." The possibility of prompt application by the clinician of many scientific discoveries, and on the other hand, the scientific problems that arise in clinical work, tend to co-ordinate the labours of the biologist, the morbid anatomist, the therapeutist, the hygienist, the physician, and the surgeon. As a consequence of this closer contact, Professor Cushing thinks that the leaders in medicine and surgery will come more and more to hold an academic attitude. This means, we take it, that professors of the two great practical divisions of medical science will have to give their time wholly to teaching. Whether such a change would really be to the advantage of medical education is open to question. The practice of an art is surely best

* *The Historical Relations of Medicine and Surgery to the end of the Sixteenth Century.* London, 1905.

learnt from its acknowledged masters. An "academic" professor of surgery or medicine might teach the theory admirably, but would scarcely be accepted by students as the best guide to the solution of practical problems. Medicine and surgery must be rooted in observation, and can only flourish in a soil of clinical experience. Moreover, the knowledge gained from that experience must be constantly enlarged by wider opportunities of studying disease.

Perhaps the most notable part of Professor Cushing's brilliant address is the change in the scheme of the scientific work of hospitals and in the relation between the general practitioner and these institutions which he adumbrated. He said that as disease becomes better understood the complexities of its accurate recognition and successful treatment required the studies of an increasing number of co-workers. As an example he took syphilis. The discovery of the spirochaete and the study of its biology have, he said, taught us that in certain parts of the body, especially the central nervous system, the organism is not accessible to the former methods of treatment. In the case of cerebral gumma, for instance, the patient has headaches and a suspicious clinical history. "What is required? A lumbar puncture, a cytological study of the fluid, and the Wassermann test requiring one specialist; an ophthalmological and perimetric examination needing another; a neurologist to determine the situation of the lesion; probably, too, a roentgenologist; and in the end, perhaps, another, to administer salvarsan, or, if it is a non-absorbable fibro-syphiloma, an operation may be needed." It is obvious that all this cannot be done efficiently by one man, however encyclopaedic his knowledge. The co-operation of an army of experts, such as Professor Cushing thinks necessary, can be secured only in numerously staffed hospitals. For that reason he holds that the more difficult and complicated problems of disease will gravitate to large institutions, officered by directors of hospital units in continuous service who devote themselves to their work without entering into competition for practice outside the walls of the hospital. When this system has been established, the general practitioner, who is now slowly but surely becoming a vestigial remnant of a past state of things, will have a larger field of usefulness than he had before; this, as far as we understand Professor Cushing, will be by supplying material for the manifold forms of specialized skill to be found among hospital officers who are "in no sense his competitors but rather his coadjutors." We gather that the multifarious hospital officers are to be paid, and that they are to take advantage of their opportunities to investigate and observe the conditions of disease for other and higher reasons than the expectation of financial returns from competitive practice. We are not told where the money is to come from, but it is obvious that if men of the kind Professor Cushing has in his mind are to be had in sufficient numbers a very large amount will be required. The patients must pay, and if the public rush to hospitals when they are ill, it seems to us that there is a risk that the poor will be thrust aside.

In restoring the general practitioner to his rightful place, Professor Cushing would apparently eliminate the private consultant. His medical commonweal, as we understand it, would consist of hospital specialists arranged in a hierarchy whose work would be carefully organized so as to ensure that no part of the patient's physical economy should escape scrutiny. While fully appreciating the advantages offered by the concentration of effort from all sides—pathological, diagnostic, therapeutic, and so forth—we confess that the proposed new arrangement of the work of the profession seems to us a dream. It reminds us of a true story of a man overtaken in a foreign city by some obscure malady. At the consultation, to which several experts were called, one after the other said he had examined the man's blood bacteriologically, microscopically, and chemically; another his urine, another his faeces, and so forth, without finding anything particular. Whereupon a hard-headed Scottish doctor who was present as *amicus curiae* exclaimed, "Have you examined the *man?*" This was just what had not been done. It seems to us that in Professor Harvey Cushing's elaborate scheme of scientific co-operation there is no provision for examining the man. The mental factor which plays so large a part in disease and its treatment seems in this new dispensation to be ignored. By all means let us have co-operation between the scientific investigator and the practitioner. But in this country at least we think neither the profession nor the public is prepared to accept a scheme in which the ablest men would be salaried officers confined exclusively to public practice, while the general practitioner is reduced to play the part of jackal to the scientific lions caged in hospitals.

CHEMIOTHERAPY.

In another part of this issue will be found the very complete account of the problems and the triumphs of chemiotherapy with which Professor Paul Ehrlich enlightened the general session of the International Congress of Medicine a week ago. Chemiotherapy is the newest branch of the science of synthetic chemistry. It aims at the cure of disease by rationalized chemical principles, applied inductively, founded on the results of exact chemical and biological research. Its success is to be judged by the therapeutic results to which it leads. In the past new remedies for disease have been found—or have been stumbled on, one may rather say—by empirical methods alone. New medicinal herbs have been brought to light by the traveller or botanist, new chemical compounds have been introduced by the synthetical chemist; both herbs and drugs have been given to the patients afflicted with various diseases, and if the results have been happy they have been claimed as evidence of progress, a new triumph of the therapeutic art. This is the older method that has given us the vast majority of the drugs with which we are at present acquainted. We owe it a great debt of gratitude, and probably nobody would be so rash as to say that its day is past, its work done. But the time has come when the newer method of drugging diseases must be seriously taken into account, the method advocated by the chemiotherapists, with Professor Ehrlich as their protagonist. It is impossible to deny that a method of investigation that has given us so powerful a drug as salvarsan, to name but one of many, is worthy of the most respectful consideration. Its application at the present time lies solely in the treatment of the different infectious disorders.

What is the exact nature of the problem the chemiotherapist sets out to solve when called in to prescribe for a man or an animal infected with some living parasite—protozoan, trypanosome, spirochaete, visible or ultramicroscopic bacterium? The problem is, how to find a drug that will kill the parasites without hurting their host. To kill the parasites in

test-tube experiments is easy, and can be done by any one of the many disinfectants and antiseptics in daily use. In the animal body, however, these disinfecting agents show a uniform tendency to attach themselves to and destroy the tissues of the host, leaving the infecting agent comparatively unharmed. To use Ehrlich's terminology, such drugs are organotropic and not parasitotropic. As an example may be quoted Koch's experimental attempt to cure anthrax by injecting sublimate solution; the anthrax bacilli flourished untouched, the host it was that died—of sublimate poisoning. The chemiotherapist has, therefore, to make and try a succession of synthetic compounds of such a chemical constitution as his experience shows him are likely to be parasitotropic in a high degree, organotropic as little as possible. Patience, skill, luck, and—last, but not least—money, are the four chief factors upon which his chances of success depend. Chemical compounds can only act upon the cells (whether the cell-bodies of parasites or the cells of the tissues that build up the human body) to which they are fixed; the only agent that can fix them is chemical affinity. Clearly, then, drugs will only be fixed by the cells that have a definite chemical affinity for them, or, in other words, have a definite chemical relationship to them. Mercury and arsenic are both metals highly poisonous to living protoplasm. But their salts will cease to be poisonous, however much mercury or arsenic they may contain, unless they have unsatisfied chemical affinities that enable them to combine with the living protoplasm, and so to get to work upon it. The atomic groups of the protoplasm that effect these chemical combinations with drugs are called "chemioreceptors" by Professor Ehrlich; in the case of the drugs, the atomic groups that combine with the protoplasm are called "haptophores"; the atomic groups that exert the toxic action on the protoplasm are called "toxophores." To take the case of salvarsan, whose structural formula is set out by Professor Ehrlich, the trivalent arsenic molecules are the toxophores, the ortho-amido-phenol groups are the haptophores; the rest of the molecule is therapeutically indifferent.

There are many obstacles in the chemiotherapist's path, and Professor Ehrlich pointed out a few of them in the course of his address. To begin with, the difficulty of finding a synthetic drug that will kill the parasites without harming the host is enormous. Next, unless the parasites are all slain by a single injection at one fell swoop, the survivors may acquire a degree of immunity to the drug that will enable them and their progeny to live through subsequent injections. Again, the animal organism may contain dead corners, spots to which injected drugs have no means of access, such as the space which is filled by the cerebro-spinal fluid; and parasites may be harboured safely there when they are killed throughout the rest of the body by the injection of some parasitotropic drug. A fourth difficulty may lie in this—that the patient unhappily chances to be supersensitive to the drug, by an idiosyncrasy that makes it far more toxic to him than it is to the ordinary individual. Professor Ehrlich indicated the ways in which these and other difficulties are to be vanquished, and concluded his address in an optimistic strain.

Chemiotherapy aims at the cure of infectious diseases by sterilizing the patient and killing the infecting agent in his tissues; what has been somewhat magniloquently termed a *Therapia sterilisans magna*—cure by sterilization on the large scale—is the objective. Should some of the parasites survive the first attempt at their destruction, the chemiotherapist falls back on a *Therapia sterilisans fractionata*, takes two or more bites at the cherry, and kills off the surviving parasites with a second or possibly more injections of his synthetic drug. Framboesia, or yaws, a tropical cutaneous complaint caused by a spirochaete, is almost always cured by a single injection of salvarsan. Syphilis is now recognized to be less amenable to the treatment than this; and, though a satisfactory cure by one injection is claimed for a fair percentage of the cases, the syphilitic will generally have to take his sterilization by salvarsan in fractional or fractionated doses.

In the human and animal diseases caused by protozoa and spirilla, speaking generally, the results obtained have been extraordinarily successful; Professor Ehrlich believes that the whole host of bacterial infections will be driven into the corner by the chemiotherapist before many years have passed. He looks to see great advances made now that the principles and methods of chemiotherapy have been firmly established on a working basis. Union is force; he takes the opportunity afforded by the meeting of the Seventeenth International Medical Congress to call upon the scientific men of all countries to combine and work together for the advancement of chemiotherapeutic research.

MEDICINE AND PUBLIC HEALTH.

IN the proceedings of the Seventeenth International Congress of Medicine three Cabinet Ministers took some official part. Lord Morley presided at the Government banquet given on the evening before the formal opening of the Congress, Sir Edward Grey took part in that ceremony next day, and on Tuesday last that sturdy optimist, Mr. John Burns, President of the Local Government Board, delivered before the members of the Congress an oration, printed in full upon another page, in which he set out to prove how far and fast social sanitary science and preventive medicine have advanced during the last thirty years. He did it with conviction, as readers of his address will see; and his conviction will no doubt be shared by his readers, for the address is grounded on a mass of statistical evidence, arrayed by the skilful hand of an expert, as convincing as it is intelligible. Every year about half a million people die in England and Wales; but if the conditions of our daily life were not more healthy now than those prevailing thirty or forty years ago, fully another quarter of a million would die every year in England and Wales. The cost in hard cash at which this saving of life has been bought must be reckoned in hundreds of millions of pounds, as the figures quoted by Mr. Burns show; yet nobody can say that the price paid has been excessive, and it must be remembered that much of this expenditure is sunk in lasting improvements that will continue to yield valuable returns for many years to come.

The motives that caused the English to become pioneers in sanitation and the legislation of public hygiene are analysed by Mr. Burns. Philanthropy was one. Englishmen had always been found to champion lost causes and take sides with the weak, the suffering, and the oppressed. Panic was another. In 1831-2 there were over 40,000 deaths from cholera in the United Kingdom, and later epidemics of the same disorder drove home the lesson that dirt makes disease—that local insanitary conditions are closely connected with the visitations of epidemic fevers. A third factor that drove us on along the upward

path was economic necessity—due recognition of the fact that loss of health means loss of time and money. At the present time the realization of this conception is, perhaps, the most powerful of the stimuli to which our local authorities react. Once they have grasped that health means wealth, they are willing to expend the ratepayers' money on local sanitary improvements.

The President of the Local Government Board devoted much attention to proving to his audience the advantages of notifying diseases. The history of the registration of diseases is inseparably bound up with the history of public health. Such registration provides the solid facts that form the basis of successful hygienic and preventive legislation; the exact nature and distribution of the conditions and abuses that are to be improved off the face of the earth must be known before they can be scientifically attacked. He argued that very few cases of hardship had actually occurred as a result of the compulsory notification of tuberculous patients established by law in England and Wales at the beginning of the year 1912. He had reason to expect most valuable results from the Notification of Births Act. This Act enables medical officers of health to obtain information as to births within thirty-six hours of their occurrence, whereas registration of the birth may be delayed for six weeks. Armed with this speedy knowledge, the medical officer of health will be able to have early visits made by the nurse or health visitor in cases where it seems advisable. The scientific period of preventive hygiene may be dated from the times of Lister and Pasteur; the remarkable pioneering done before their day was the work of practical men whose virtue lay in the recognition of good results when they had been obtained, but until the science of bacteriology had become firmly established the *rationale* of hygienic measures was incapable of scientific analysis.

Many other points of interest will be found discussed in the address, but reference is made to but one of them—the sterling work done by the nursing profession. Our nurses are probably the best in the world, and, thanks to the pioneer work of Florence Nightingale, they were among the first; but the fact that she derived much of her technical knowledge from Germany is an instance of the interdependence of nations in all matters affecting medicine and the public. Mr. John Burns enumerated a number of general and special hospitals in the United Kingdom with an aggregate of 15,500 beds between them. No fewer than 6,083 nurses were engaged in the day and night service of these beds in the year 1911; that is to say, for every five patients there were two nurses. In addition to these, thousands of nurses are engaged in private nursing, thousands more are busy as Queen's Jubilee nurses, parish nurses, district nurses, tuberculosis nurses, school nurses. Yet the whole nursing profession as we now know it has grown up since the middle of last century.

Medical science is cosmopolitan, and so is the science of social reform that strives to improve the health of nations. In matters of health no people stands alone; each profits by the successes of the other nations, just as it stands to lose by their failures or mistakes in sanitation. Mr. Burns took a yet wider view, and looked forward to the days when armaments will be no more, when gigantic sums of money will be set free for the reforms waiting to be financed, and poverty will have been improved away by the radical treatment of its cause. We hope this dream may come true.

NOTES.

Some General Impressions.

The Seventeenth International Congress of Medicine is among the successes of the past. That it was a success, and a very great success, there can be no doubt. Quite apart from the unstinted praise expressed in the resolution proposed by Professor Burger on behalf of the Permanent Commission of International Medical Congresses, and unanimously adopted at the closing meeting, there was abundant evidence of the satisfaction felt by foreign members. It found expression not only at the many sectional dinners and entertainments, but in the course of private conversation. The success was both scientific and social. In spite of the large number of sections (there were twenty-six altogether counting the subsections, as they should be counted since each had its own organization and met independently) all were well attended, and very many valuable discussions took place. This success, to which our Canadian brethren bear witness in the graceful resolution printed on the next page, could not have been attained had not a great deal of energy been thrown into the task of preparation by the Executive Committee of the Congress, over which Sir Alfred Pearce Gould presided, and by the officers of the sections, who took care that the subjects selected were living questions of the day, and that the reports upon them were prepared by the highest authorities available, irrespective of nationality. Last week we gave short accounts of the opening meetings of some of the sections. This week we continue these condensed reports covering a larger number of sections, and it is intended to complete the review of the work of the sections of the Congress in our next issue.

On the social side the intention was to show the foreign members those institutions of London in which they were likely to take most interest, to extend to them official hospitality, in which the executive of the Congress was readily seconded by the Government in the name of the nation, and by the medical corporations and chief scientific institutions in London, and, lastly, to offer, as the occasion presented itself, the more intimate welcome for which the numerous dinners, receptions, and parties given by the several sections afforded opportunity. These occasions were supplemented by private hospitality. We have not been able to mention all the public or semi-public receptions and entertainments, but those of which some account is given in the following pages will afford a sample of the rest. The organization of arrangements of this magnitude involved a great amount of work both before and during the Congress, and it is very largely due to the work of Dr. Clive Riviere that everything in this respect was so well managed; while the profession is only less indebted to the President's daughter, Miss Barlow, who did admirable service for the Ladies' Committee, which had undertaken the duty of providing opportunities of interest and amusements for the ladies who accompanied the male members of the Congress while they were engaged in the sections.

It was anticipated that the number of members attending the Congress would be very large, and this anticipation was more than fulfilled. The task of providing machinery for registering all the members of the Congress, and giving them the information, printed and verbal, of which they stood in need, was extremely difficult. It was entrusted to Mr. Hamilton, for the loan of whose invaluable services the Congress was indebted to Mr. H. S. Wellcome. Mr. C. M. Page, Resident Assistant Surgeon at St. Thomas's Hospital, had the general supervision of the arrangements for the meetings at the Albert Hall, and for the sectional meetings. He was ably seconded in this work by Dr. J. M. Wyatt, Obstetric Tutor at St. Thomas's Hospital, while to Mr. Pearce Gould, of the Middlesex Hospital, son

of the Chairman of the Executive Committee, fell the task of editing the daily journal of the Congress and supervising each issue. Dr. Philip Hamill, of St. Bartholomew's Hospital, undertook the duty of superintending the Inquiry Bureau, which, during the earlier days of the Congress at least, was besieged by anxious inquirers of every nationality, and in this connexion the very cordial thanks of the executive are due to Dr. A. R. Allen, of Philadelphia, Secretary of the American International Committee, who gave himself up for several days to assist Dr. Hamill in his onerous task. Again the executive have to thank Sir Lauder Brunton for the trouble he took in arranging with the Post Office authorities for the efficient working of the temporary branch post-office.

Finally, two names remain to be mentioned with special gratitude and appreciation. One is that of Mr. G. H. Makins, C.B., one of the treasurers of the Congress. His experience of the Congress in London in 1881, when he was deputy secretary, was invaluable on all questions of general organization, and the energy and time he gave to the work cannot be too warmly recognized. The other name is that of Dr. W. P. Herringham, the general secretary of the Congress, upon whose shoulders rested the final responsibility for everything that was done. His name has, so far as we have observed, only once been mentioned throughout the whole of the proceedings, when, at the opening ceremony, he spoke partly in his other capacity of Vice-Chancellor of the University of London. Nevertheless, in the nervous system of the Congress he has been the cortical sensori-motor centre, collecting the centripetal impressions, combining them with unerring judgement, and reflecting them into action at the periphery. We desire to offer him warmest congratulations on the admirable result of his action both in initiative and control.

Lastly, let us repeat what every one is saying—namely, that if our guests carry away with them a pleasant recollection of London, of the welcome they received there, and of the spirit of British medicine, it will be in very large measure due to the personality of the President. Without appearing to make any special effort, he has always said and done the right thing. There has been a note of sincerity in his welcome, which truly expressed the feelings of the profession in this country, and, as we have been assured by very many of them, was thoroughly understood and appreciated by our foreign guests. Moreover, in all his utterances he has emphasized the human side of medicine—in two senses. The first is the sense of the fellowship which exists among men and women of every nation engaged in the same beneficent calling and sharing everywhere alike in its triumphs and in its disappointments. To this feeling of comradeship expression has been given during the hospitalities of the last week in every tongue spoken from China to Peru, and by no speaker more effectively than by the President. The other sense in which he has emphasized the human side of our calling—and in this he has truly reflected the best traditions of medicine in this country—is that he has insisted in all his more public speeches on the truth that in the body politic medicine holds a place essential to the commonweal with the special mission to prevent disease, to alleviate suffering, to safeguard the development of youth, and to prolong useful life to old age—a mission which it can fulfil as it would desire only when left free to go on with its own work in its own way. There are no keener critics of each other than men of the same calling; of this the discussions of the Congress have given ample proof. If the Congress has separated without giving an answer to some of our most pressing problems; if we are very much where we were with regard to cancer, to immunity and anaphylaxis, and, to take only one other instance, to the true interpretation of the causes and the nature of cardiac disorders, there has been at least frank discussion of the facts and frank criticism of theories. This process of sifting is essential to scientific work of permanent value, and it is not every man who can apply it to his own work. One of the most important functions of such gatherings as that which has just come to an end in London is to give this process full play and to prevent the hasty putting into force, in practice or legislation, of measures founded on theories which have not passed through the ordeal of discussion and criticism, and the test of experiment in other hands than those of the originator. It is a common gibe that doctors differ; they differ until they are convinced that the truth has been found. Then they speak with a single voice, as they have spoken at this Congress about vivisection and venereal diseases for instance. The truths they then enunciate are not always very palatable to the public, which excuses itself by finding other topics among those discussed at a Congress to which the gibe applies. It has been the great achievement of the President of the London Congress to give expression in no uncertain tone to some of the convictions which world-wide medicine has reached, and by so doing he has laid his profession and the public under a deep debt to his knowledge, sincerity, and courage.

CANADA AT THE CONGRESS.

THE Canadian members of the medical profession who have been attending the International Congress met on Tuesday morning, August 12th, under the chairmanship of Dr. W. H. B. Aikins, Dr. H. B. Anderson acting as secretary, when the following resolution was unanimously passed, on the motion of Dr. J. T. Fotheringham (Toronto), seconded by Dr. J. M. Elder (Montreal):

> That we wish to offer to the President, Sir Thomas Barlow, to the Secretary, Dr. W. P. Herringham, and to the whole Committee, our hearty congratulations upon the great success which this meeting of the Congress has attained under their kindly and able administration. But particularly as members of the great British family do we desire to express the sense of familiar, homely intimacy which is felt by all of us, enhanced as it is by the presence of so brilliant a gathering of the savants of other climes and races. For as Canadians revisiting the motherland—*coelum non animum mutamus*—we deeply appreciate the real significance of the idea expressed by His Royal Highness Prince Arthur of Connaught in his gracious address of welcome, that all of us of the Empire stood together as hosts to all the rest of those attending. We noted with pleasure the repetition of this idea by the President in his address.
>
> On behalf of the Canadian ladies, we wish to thank the Committee of Ladies here for the profuse and well-ordered hospitality shown by them, and the many arrangements made for the comfort and entertainment of our wives and daughters.
>
> And as we part, each one to his own work across the seas, we beg to offer to all our kind hosts and friends in London our cordial felicitations, thanks, and good wishes.

The last general entertainment in connexion with the Congress was given on Monday night at the Royal Botanic Gardens by the High Commissioner for Canada, Lord Strathcona and Mount Royal. The guests were received by Lord and Lady Strathcona in person, and this act of courtesy was by no means a light undertaking, for the guests numbered several thousands. Beginning about half-past nine the flow of arrivals continued uninterruptedly until nearly eleven o'clock. The night, fortunately, was exceptionally fine and warm, and the gardens were attractively lighted by arches of Chinese lanterns. The large dining-hall of the club house of the Royal Botanic Society was one of the centres at which refreshments were served, and just in front of this building had been placed, by way of marking the special character of the evening, a full-sized model of the colossal statue of Harvey by Bruce Joy, which was unveiled on the promenade of Folkestone just thirty-two years ago in the presence of Owen, Huxley, Paget, and other great men of that day

The model was that which was on view at the Royal Academy in the same year. The palm houses, where the Princes' Red Band was playing popular airs, was another centre of attraction, while in the gardens themselves the band of the Royal Artillery played some fourteen or fifteen pieces which appeared to have been carefully selected from the repertoires of all the principal nations. A successful effort in the same direction was made also by a quartet party, which chose its folk songs from the ballads of many nations, including Spain, China, Roumania, and Sweden. Another happy idea was the presence of some pipers from the Scots Guards, who from time to time supplied some Scottish music and gave an exhibition of sword dancing. The assembly did not separate until midnight.

A French Tribute to Lister.

During the Congress there has been no name more often on the lips of those who took part in public and semi-public occasions than that of Lord Lister, and on every hand the revolution which he brought about in surgery was fully and enthusiastically recognized. On Monday a number of distinguished French members of the Congress paid a tribute to his memory. A large party visited the Royal College of Surgeons and Dr. J. Lucas-Championnière placed a laurel wreath entwined with roses on a bust of Lord Lister placed temporarily in the hall of the College. Among those who accompanied M. Lucas Championnère were Professor Chauffard, Professor Pozzi, Professor Legry, Professor Wallich, Professor Lapersonne, Professor Lagrange, and MM. G. Etienne, Le Noir, Savariaud, and Dr. Raoul Blondel (Secretary of the French Committee). The wreath bore the inscription: "à Lord Lister: les Médecins Français: XVII^e^ Congrès." Dr. Lucas-Championnière spoke of the life and work of the illustrious British surgeon, the value of whose system, it may be noted, he was one of the first of Continental surgeons to appreciate. The visitors were received by the President of the College, Sir Rickman J. Godlee, who afterwards showed them some of Lord Lister's instruments and a collection of drawings made by his own hand. The bust is not yet quite complete, but the sculptor, Sir Thomas Brock, R.A., allowed it to leave his studio for this special occasion. The model was in the exhibition of the Royal Academy.

The Transactions of the Congress.

Each member of the Congress will receive a copy of the transactions of the Section to which he belonged, but it has been arranged to supply the complete set of the Congress transactions for a subscription price of £4. Applications should be addressed to the publishers, Messrs. Frowde, Hodder, and Stoughton, Oxford Press Warehouse, Falcon Square, London, E.C.

The Pathological Museum.

We mentioned briefly last week the remarkable collection of physiological and pathological specimens brought together by the committee of which Professor Arthur Keith was chairman, and Mr. H. W. Armit the energetic secretary. The catalogue of this museum, printed in English, French, and German, is a portly volume of over 500 pages, and the number of separate entries in each language exceeds 4,000—a fact which may give some idea of the amount of work involved in the arrangement, classification, and indexing of so large a collection. To give any full account of such a collection here would be out of the question, and only those—and they were many—who took the trouble to spend an hour or two in the museum can have gained an adequate conception of the many interesting specimens which were to be seen. We may, however, take occasion here to refer to the extraordinarily beautiful set of specimens shown by Professor Werner Spalteholz of Leipzig to illustrate the method he has devised of rendering organs and tissues transparent. In the series was a set of specimens rendered transparent by immersion in oil of wintergreen and benzyl-benzoate. Among these were complete bodies of a sole, frog, and rat, in which the bones were stained with alizarin, all the other parts being perfectly transparent, so that it was only by looking at the specimen in profile that it was possible to realize that one was not looking at a dissection. Two other specimens of very particular interest showed the base of the skull of the human fetus at various ages; the fact that the bones were stained with alizarin gave an idea of the extent of ossification at the several ages which no elaboration of description could convey. Another very instructive specimen showed the base of the skull decalcified and rendered transparent, the labyrinth being filled with opaque metal. Dr. Spalteholz also demonstrated the method in which the remarkable preparations were obtained. Another very interesting set of preparations were shown by Professor B. Wahby of Cairo, who gave a special demonstration of his method to the Section of Anatomy. The specimens were obtained by injecting vessels and ducts with a fusible alloy consisting of bismuth, lead, cadmium, and tin. The demonstration was illustrated by a large number of very beautiful specimens showing the distribution of the finer vessels and ducts in various organs. Professor Wahby also showed a number of specimens of celluloid injections. Finally, we have received from our reporter in the Section of Forensic Medicine the following note upon that department of the museum which particularly interested him: "The actual exhibits (tangible realities) consisted," he writes, "of three cut-throats and the weapons with which the injuries were inflicted; the stomach of a small child poisoned intentionally (infanticide) by carbolic acid; another stomach showing the effect of chloride of zinc; a uterus showing on the cervix the lacerations produced by a clumsy abortionist; a fetus dug up from the garden together with a catheter and stilette (there was no evidence but that of propinquity in position to show whether these two exhibits were from the same case); an aneurysm of the aorta, ruptured during effort (the interest of the case seemed to lie in the statement that the employers had admitted liability for an 'accident'). In addition to the above there were a large number of photographs of very gruesome objects illustrating: (1) Fatal burns and scalds (5 photographs); (2) injuries to the skull (6 cases, 1 in a newly-born child from precipitate labour); (3) drowning (4 cases); (4) exhumation (3 cases); (5) tattooing (2 cases); (6) murder by violence (stabbed 4 cases, kicked to death 1 case, murdered by fire-tongs, 1 case, cut-throat and general violence 10 cases); (7) cases killed in the North Sea disaster (!) by the Russian fleet (2 had the top of the skull blown off); (8) illustrations of forms of suicide: (*a*) burning by soaking clothes in paraffin and purposely igniting them, (*b*) cut-throat, (*c*) gunshot, (*d*) hanging, (*e*) drowning. The collection was certainly a striking one, and would serve a purpose in instruction when actual cases could not be obtained."

President's Dinner.

On the eve of the dissolution of the Congress on Monday the President, Sir Thomas Barlow, entertained a large party, including some of the most distinguished members of the Congress, to dinner at the Savoy Hotel. Among his guests were Professor Chauffard, Professor Harvey Cushing, Professor Ehrlich, Professor Bateson, and Mr. John Burns, who were responsible for the five general addresses to the Congress. Among the distinguished foreign guests present were the American Ambassador, Professor F. S. von Müller, subsequently elected President of the Eighteenth International Medical Congress, which is to be held in Munich in 1917; Professor Waldeyer,

M. Lucas-Championnière, Professor L. F. Barker (Johns Hopkins), Professor von Eiselsberg, Professor Fuchs, Professor de Gama Pinto, Professor Gradenigo, Professor Hirschberg, Professor Rovsing, Professor Blanchard, Professor Max Verworn, Dr. Soubbotitch, Dr. Babinski, Dr. Bianchi, Dr. Ascoli, Dr. Calleja, Professor Frankl-Hochwart, Professor Kirmisson, Professor Burger, Dr. Koplik, Professor d'Eternod, Professor Recasens, Professor Pozzi, Professor Strassmann, Professor P. Janet, Dr. P. Heger, Dr. Van Rynberk, Professor Kubo (Japan), and Dr. Wu Lien Teh, China. Among many of our own distinguished fellow-countrymen were the Archbishop of Canterbury, the Lord Chancellor, His Eminence Cardinal Bourne, Lord Strathcona, the Right Hon. Sir George Reid, Sir Archibald Geikie (President of the Royal Society), the Lord Mayor of London and two ex-Lord Mayors (Sir Thomas Crosby, M.D., and Sir Vesey Strong), the Right Hon. Sydney Buxton, the Director-General of the Medical Department, R.N., Sir William Macewen, Major Darwin, F.R.S., Professor Francis Dixon and Dr. James Little of Dublin, and many of the officers of the Sections. After dinner Sir Thomas Barlow bade his guests welcome and farewell in one breath, and dwelt on the point, to which Sir Edward Grey had given prominence at the opening meeting of the Congress, that the welcome to foreign members was extended not only by the citizens of the United Kingdom but by those of the great Overseas Dominions of the British Empire. In this connexion Sir Thomas Barlow referred especially to the way in which Lord Strathcona, High Commissioner for Canada, and Sir George Reid, High Commissioner for Australia, had associated themselves with the work of preparation. The toast was acknowledged by M. Lucas-Championnière speaking in the name of France, and by Professor Ehrlich speaking in that of Germany. The guests afterwards adjourned to another room and during the evening had the pleasure of listening to English madrigals and part songs admirably rendered by the Westminster Singers.

ORTHOPAEDICS.

ON Friday evening, August 8th, the President of the Orthopaedic Subsection entertained at dinner at the Royal Automobile Club the members of the Subsection, the ladies by whom they were accompanied, and other friends—a very large party. After dinner the host called upon a representative of each country contributing to the Subsection to respond to the good wishes of the company for the advance of orthopaedic surgery in the several countries. Thus those present had the pleasure of hearing the voices, and to some extent realizing the personality of Dr. Murk Jansen (Holland), Professor Kirmisson (France), Professor Vulpius (Germany), Professor Julius Dollinger (Hungary), Professor Depage (Belgium), Professor R. W. Lovett (United States of America), Professor Hans Spitzy (Austria), Professor V. Putti (Italy), and Dr. Albert Kocher (Switzerland). All the speakers bore testimony to the host's originality and brilliancy as a surgeon, and to his geniality and charm as a man, Professor Spitzy going so far as to make some sort of shadowy claim upon him for his own country, on the ground that his name was a household word with Austrian orthopaedists. Many of the speakers were glad to take the occasion to express to Mrs. Robert Jones their warm thanks for the hospitality with which every orthopaedic surgeon who sought inspiration in Liverpool was invariably received. Finally, in a few words Mr. Muirhead Little (London), and Dr. Clarence Starr (Toronto) spoke of the esteem and affection with which Mr. Robert Jones is regarded by British surgeons. On the evening of the opening day of the Congress a dinner had been given by the committee and staff of the Royal National Orthopaedic Hospital, at the hospital, to welcome the chief foreign members of the Orthopaedic Subsection. Lord Denbigh, the chairman of the committee, took the chair, and in an admirable speech dealt with the progress of the Orthopaedic Hospital and with the history of its formation by the King's Fund from three separate institutions. The toast of "The Foreign Delegates" was responded to by Professors Lucas-Championnière, Vulpius, Putti, Murk Jansen, Clarence Starr, Dollinger, Royal Whitman, Lovett, and Turner (of St. Petersburg) for the foreigners, while Mr. Robert Jones of Liverpool answered for the English guests. Advantage was taken of the thoroughly international character of the Orthopaedic Subsection to initiate an International Association of Orthopaedic Surgery. A committee representative of the several countries was formed and authorized to found an International Association to further the progress of orthopaedic surgery, to correlate the literature of the various countries, and to arrange for the holding of international meetings. The committee consists of the following representatives, all of whom were present in London: *Great Britain*, Mr. Robert Jones (Liverpool); *Holland*, Professor Murk Jansen (Leiden); *Italy*, Professor Putti (Bologna); *France*, Professor Kirmisson (Paris); *United States of America*, Professor Lovett (Boston); *Germany*, Professor Vulpius (Heidelberg); *Hungary*, Professor Dollinger (Budapest); *Canada*, Professor Clarence Starr (Toronto); *Russia*, Professor Turner (St. Petersburg); *Austria*, Professor Spitzy (Vienna), who will act as secretary of the committee.

THE SECTIONS OF RHINO-LARYNGOLOGY AND OTOLOGY.

AN ovation in its technical Roman sense is defined as a "lesser triumph," and a triumph involved the idea of exultation over enemies; it would be wholly inappropriate here. But the secondary meaning of the word as given in the *Concise Oxford Dictionary* is "enthusiastic reception, spontaneous applause," and is correctly applied to the reception which Sir StClair Thomson met when, at the dinner given to the members of the Sections of Laryngology and Otology on August 12th, he rose to propose the toast of "The Guests." He began his speech in English, lapsed into German, drifted into Italian, and perorated in French. Dr. Urban Pritchard, in the name of British otologists, joined with the laryngologists in expressing good wishes to the foreign guests, who found spokesmen in Dr. F. H. Bosworth, who, speaking for the United States, gave reminiscences of the Congress of 1881, in Professor Dr. Gustav Alexander (Austria), Dr. G. Boval (Belgium), Professor Dr. H. Mygind (Denmark) Dr. Castex (France), Professor Dr. P. Gerber (Germany), Dr. L. Polyák (Hungary), Professor G. Ferreri (Italy), Professor I. Kubo (Japan), Professor Holmgren (Sweden), Professor F. von Stein (Russia), Professor Cisneros (Spain), and Dr. Nager (Switzerland). Earlier in the proceedings the toast of "The King" had been given by Mr. Arthur Cheatle, the President of the Section of Otology, and Sir Thomas Barlow had been very cordially greeted when he rose to propose a toast to "Laryngology and Otology." He referred especially to the help which the specialists in these subjects were able to give to general medicine by the perfection to which the bronchoscope and the oesophagoscope and the methods for examining the sinuses had been brought, and by the great practical benefits due to the mastoid operation, concluding by an expression of the opinion, loudly applauded by his hearers, that no man should become a specialist in either subject until he had served as house-surgeon and house-physician in a general hospital. Sir Rickman Godlee, President of the College of Surgeons, supported his brother President of the College of Physicians in proposing the toast, which was acknowledged by Professor Gradenigo of Turin and Dr. Luc of Paris. The toast of "The Ladies," given by Sir Felix Semon in a graceful and apposite speech, brought the evening to a close.

THE SECTION OF RADIOLOGY.

THE members of the Section of Radiology and the ladies accompanying them dined together on Saturday evening, August 9th, at the Whitehall Rooms, under the chairmanship of Sir James Mackenzie Davidson, President of the Section, who, in addition to many distinguished British radiologists, was supported by Dr. Albers-Schönberg, Dr. Fauveau de Courmelles, Professor Bergonié, and many Continental and American workers in this branch of medical science. Dr. C. Thurstan Holland (Liverpool), who proposed the one toast of the evening, that of "The President," said that Sir James Mackenzie Davidson's name would live in every book which had been adequately written or which was yet to be written on the subject of radiology; Dr. Béclère of Paris gave expression to the appreciation of those who had come from abroad of the hospitality tendered them by their British brethren.

DINNER TO FOREIGN MILITARY MEDICAL OFFICERS.

ON Monday, August 11th, the Director-General of the Army Medical Service and officers of the Royal Army Medical Corps serving in and about London entertained the foreign army medical officers belonging to the Section of Naval and Military Hygiene at the Royal Army Medical College mess. The guests were received by Sir Launcelot Gubbins, D.G., A.M.S., President of the Section, in the anteroom of the mess. Hosts and guests wore full-dress uniform, and, as most of the European countries were represented, the assembly formed a brilliant spectacle. After the customary toast to "The King" had been duly honoured, Sir Launcelot proposed the health of the guests, and in doing so gracefully alluded to the many distinguished names connected with the army medical service of other countries. The toast was enthusiastically drunk with musical honours. Rear Admiral Van Reypen, late Surgeon-General, United States Navy, responded on behalf of the United States of America; Regimentsartz Dr. Manin, on behalf of Austro-Hungary; Médecin Inspecteur-Général Vaillard, on behalf of France; Excellenz von Schjerning, on behalf of Germany; Tenente Generale Medico L. di Cavallerleone, on behalf of Italy; Médicin Inspecteur-Général Humme, on behalf of the Netherlands; and Médecin Inspecteur-Général de Raptchewski, on behalf of Russia. About midnight the guests dispersed after a most agreeable evening, during which many fresh friendships were formed in spite of the difficulty of communication that has unfortunately existed since the time of the Tower of Babel.

DINNER AT THE APOTHECARIES' HALL.

THE Society of Apothecaries gave a dinner on August 7th to meet members of the International Congress of Medicine. Mr. W. Bramley Taylor, the Master, presided, and among those present were the Wardens, Sir Thomas Barlow, President of the Congress, Dr. Josué, Professor P. Janet, Professor A. Beidl, Professor Paul Ehrlich, Professor Abderhalden, and other guests to the number of seventy-seven. The Master, in giving the loyal toasts, made special reference to the very cordial welcome extended to the Congress on behalf of the King by Prince Arthur of Connaught. Mr. Martindale Ward gave the toast of "The Foreign Guests," and mentioned how the Society of Apothecaries had always been ready to extend the hand of welcome to comrades throughout the world who were engaged in the common struggle against ignorance, disease, and death. Dr. Josué, Professor Burkhardt, and Dr. Hugh Young of Baltimore responded; the last speaker in very happy terms referred to the special delight it was to him as an American to be present in the ancient Hall of the Society of Apothecaries.

SCHOOL OF MEDICINE FOR WOMEN.

THE council and staff of the London (Royal Free Hospital) School of Medicine for Women entertained a large party of foreign and colonial members of the Congress at luncheon at the Medical School on August 7th. The Chairman of the Council, Mr. F. D. Acland, M.P., was supported by Miss Aldrich-Blake, M.D., M.S., Sir Clifford Allbutt, F.R.S., Sir Rickman Godlee, Sir John Rose Bradford, F.R.S., Dr. May Thorne, Dr. Jane Walker, Dr. Ethel Vaughan-Sawyer and other medical women. Among the guests were Professor Théodore Tuffier, who acknowledged the welcome addressed to the guests by the chairman and Dr. Mary Scharlieb, Dr. Rudolph Matas, Dr. F. von Müller, Professor Anthony, Dr. Maude Abbott, Dr. Sarah Palmer, Professor Bang, Dr. Hésiné, and Sir Charles Lukis. The Medical School laboratories were open to visitors, who were also shown over the Royal Free Hospital and the New Hospital for Women.

RECEPTIONS.

ONE of the pleasantest and most successful social events of the week was the reception on Thursday evening given by the President and Council of the Royal College of Surgeons. The guests were welcomed at the foot of the great staircase by the President, accompanied by Lady Godlee, and Sir Frederic Eve (Vice-President). The museum, the conservator's room, the library, the theatre, and the council chamber were all open, and in the latter were set out for examination various relics of John Hunter. In the theatre chamber music was in progress from beginning to end of the evening, and in the conservator's room there was a display of objects illustrative of museum methods at various dates since the preservation of pathological specimens first became a recognized art. Nor did the museum itself fail to prove attractive. Apart from the prolonged examination bestowed upon it by many of the more industriously minded of the scientific visitors, it received a considerable meed of attention from a large number of ladies who were among the guests. They wandered through most of its rooms and had the gaps in the explanations afforded by their companions of the contents of innumerable glass cases conveniently filled in by the strains of a military band, which was playing at the bottom of the first room. On the same evening the President (Sir Francis Champneys), Council, and Fellows of the Royal Society of Medicine gave an "at home" at the society's new house in Wimpole Street. In the library were shown "Queen Mary's posy of simples culled from the Physic Garden, Chelsea," being the posy presented to Her Majesty at the opening of the society's house. In the same room Dr. Deane Butcher showed a number of the artificial "organisms" prepared after the manner described by Professor Leduc, of Nantes, in his two works on the subject and demonstrated by him at the meeting of the British Association at Dundee last year. The "organisms" are intended to show that the energy of growth and tissue repair is derived from the osmotic pressure of mineral substances in solution. They are highly interesting and suggestive, but not easy to prepare, and great credit is due to Miss Deane Butcher for the success with which she accomplished her difficult task. In addition, the Honorary Librarian, Dr. Norman Moore, had set out a number of books selected for their rarity or curious medical interest, and there was shown also the stethoscope given to Dr. Peter Patrick Martin by Laënnec, who had himself used it. In the Robert Barnes Hall, Dr. Comandon, of Paris, showed a large number of cinematographic films prepared by Messrs. Pathé Frères, of Paris. The films illustated the circulation of the blood, various modes of investigating the digestive processes, the properties and reactions of living cells, and the developmental stages of various organisms, including examples of filaria, spirochaetes, and trypanosomes. In the Marcus Beck Laboratory those engaged in the John Howard McFadden Researches gave a demonstration of the jelly method of

staining cells alive and of the division of living human cells under the microscope.

Over six hundred guests, including the heads of many foreign army medical services, attended a conversazione at the Royal Army Medical College on August 7th. The Director-General, Surgeon-General Sir Launcelot Gubbins, was the host, and the arrangements were made by the Commandant (Colonel Skinner, M.V.O.) and the staff of the College. Selections were given by the R.A.M.C. band, and a very agreeable social evening was spent. The principal rooms of the R.A.M.C. mess were thrown into one, and the whole of the medical school was occupied by a collection of military medical appliances, tropical and pathological specimens, hygienic outfits, and examples of military equipment from the principal armies of the world. Demonstrations were given of methods of determining the energy value of food, of x-ray apparatus, sterilization of water, food analysis, and of field medical and surgical equipment. Cinematograph films were projected illustrating the effect upon spirochaetes of injections of salvarsan, and a number of microscopic specimens were shown.

On the same evening the Grocers' Company gave a reception to 500 guests.

The principal attraction of Friday evening, August 8th, was a welcome accorded to the Congress by the Lord Mayor and Corporation of the City of London. It took place at the Guildhall, where the guests were welcomed and subsequently entertained in a fashion thoroughly in keeping with the great reputation of the City for hospitality. Not the least interesting feature of the evening for most of the guests was the fact that each in his turn had to play a part in a courtly old-world ceremony. The Lord Mayor (the Right Hon. Sir David Burnett), the Lady Mayoress, and the great officers of the corporation robed in the fashion of a long bygone day, were standing on a dais in front of which a passage was kept open by silk cording. One each side was an array of guests, and down this long, broad passage each new arrival, his name having been loudly announced, went to make his bow to his hosts. Thereafter he found at his disposition a plentiful choice of occupation for the rest of evening. The council chamber had been converted for the nonce into a variety theatre, the library into a ball room, the art gallery into a music room, the museum into a promenade, and the ancient crypt into a vast refreshment bar. There was also a display of plate belonging to the corporation and of ancient charters, and each guest received an elaborate programme containing numerous illustrations of the Guildhall and its annexes.

Garden Parties.

Very many garden parties were given during the Congress, and for the most part they were very little interfered with by the eccentricity of English weather. Unfortunately, on the first afternoon on which such parties were given (Thursday) the weather was rather inclement, but in spite of this a large number of guests attended a garden party given by the Dean of the Faculty of Medicine of the University of London and Lady Pearce Gould on August 7th. The grounds of the Theological college in Regent's Park were lent for the occasion by the Principal, Dr. John Gould, and their attractions were much appreciated. The band of the University of London Officers' Training Corps rendered selections in the grounds, and a concert took place in the library. On the same afternoon there were garden parties also at Bethlem Royal Hospital, and at the new King's College Hospital.

A very successful garden party was given by the Governors and staff of St. Thomas's Hospital on Friday afternoon, August 8th. The hospital wards were open for the inspection of the visitors, and music and other entertainments were provided in the grounds. On the same day garden parties were given at St. Bartholomew's Hospital and by the Ladies' Committee of the Section of Surgery with the Subsections of Orthopaedics and Anaesthesia at the Royal Botanic Gardens, where the bands of the Coldstream and Scots Guards and the pipers of the latter played.

A large number of members of the Congress and ladies attended the garden party given by the King at Windsor Castle on August 9th. His Majesty was not in residence, but the guests were received by the Lord Chamberlain (Lord Sandhurst) and the Comptroller of the Lord Chamberlain's Department (Colonel Sir Douglas Dawson). On arriving at the Grand Entrance the guests were conducted in parties through the State apartments, and, passing out to the East Lawn, were entertained to tea in several large marquees decorated with carnations and roses. Many of the visitors took away the flowers as mementoes. The bands of the Royal Horse Guards and the Coldstream Guards rendered selections during the afternoon, and before leaving the visitors were conducted through the Albert Memorial Chapel and St. George's Chapel.

On Sunday afternoon Mr. Waldorf Astor, M.P., received a large party in the beautiful garden of Cliveden. The view from the Terrace down the Thames with the woods of Cliveden and Taplow on the left hand is one of the most charming and restful which "the banks of the serene Thames" afford. The river also afforded solace to others, for the Laryngological and Otological Sections went to Oxford, the Physiological Section picnicked on its banks, and Sir Watson and Lady Cheyne gave a river party to a large number of the members of the Surgical Section.

A garden party was given by University College Hospital and Medical School, in the grounds of University College, on August 11th. The Duke of Bedford, as President of the School, received the guests in the library, and with him were Captain E. S. Dawson (chairman of the general committee) and Lady Dawson and Dr. George Blacker (dean of the medical school). Tea was served on the lawns of the college, where the visitors were received by Dr. T. Gregory Foster, Provost of University College, and Professor G. D. Thane, Dean of the Faculty of Medical Science. The wards of the hospital and the departments of the medical school were opened to the inspection of the guests, who were provided with a handsomely printed descriptive booklet and guide. On the same afternoon the medical and surgical staff of the London Hospital gave a garden party in the grounds of the hospital, where the guests were received by Sir Frederic Eve, the senior surgeon, and Sir Bertrand Dawson, senior of the physicians of the hospital now in London. Visitors were conducted over the hospital, the nursing home, the Finsen light department, the medical college, and the new dental school, members of the staff, students, and nurses acting as guides and interpreters. On this day a garden party was also given at Guy's Hospital.

Welcome to Medical Masons.

The nine medical lodges of London gave a united welcome to Masonic members of the Congress at a special meeting held on Monday afternoon at the headquarters of the brotherhood, Freemasons' Hall, under the banner of the Aesculapius Lodge, No. 2,410. The other lodges associated with the gathering were the Rahere Lodge, No. 2,546; the Cavendish, 2,620; the Sancta Maria. 2,682; the Middlesex Hospital, 2,843; the London Hospital, 2,845; the Chère Reine, 2,853; the King's College Hospital, 2,973; and the Lanesborough, 3,029. About 150 members of the medical lodges and officials of the Grand Lodge of England were present, and there were 100 visitors from all parts of the world. The lodge having been opened by the officers of the Aesculapius Lodge, of which Bro. A. P. Beddard is Master, the Pro Grand Master of England (Lord Ampthill) entered, accompanied by several Grand officers, and took the chair, appointing Bro. Edmund Owen and Bro. Ernest Clarke, both Past Grand Deacons, to assist him as

Wardens. Lord Ampthill said he had the honour to address the assembly on behalf of the Grand Master (the Duke of Connaught) in the name of the Freemasons of England, and for the different lodges who were acting as hosts on that occasion. He read a letter which he had received from the Duke of Connaught, who regretted that he was unable to be in London that day, and desired him to welcome very warmly, in his name, the medical Freemasons present. Lord Ampthill paid a high tribute to the members of the medical profession, who, he claimed, carried out the Masonic principles of Brotherly Love, Relief, and Truth even better than any other class of men. Bro. Owen followed with an address in French, and Bro. Clarke with one in German. Replies were made by Bro. H. Haberlin, P.G.M. of the Grand Lodge Alpina of Switzerland; Bro. W. E. Redman, Prov.G.M. of the Nelson and Marlborough District of the Grand Lodge of New Zealand; Bro. Pellegrino Ascarelli, Grand Treasurer of the Grand Orient of Italy; Bro. C. M. Green, P.D.G.M. of the Grand Lodge of Massachusetts, U.S.A.; and Bro. Polak, of the Symbolic Grand Lodge of Hungary. On the proposition of Bro. D'Arcy Power, P.G.D., votes of thanks were accorded to the Grand Master, to the Pro Grand Master, and to Bro. R. J. Probyn-Williams, P.G.D., who had acted as honorary secretary.

ESPERANTO.

A MEETING of the Universal Esperanto Medical Association was held on Friday, August 8th, in the Geological Laboratory of the Royal School of Mines, South Kensington, when the President, Mr. George Jameson-Johnston, Professor of Surgery at the Royal College of Surgeons in Ireland, was in the chair. Speeches were delivered not only in Esperanto, but also in French, Russian, German, Spanish, and Polish, for the conversion of those present who had not already acquired the art of speaking Esperanto. Several speakers contended that owing to the variety of language, members of the Congress tended to resolve themselves into small national conferences. The proceedings were continued on Monday morning, and were conducted entirely in Esperanto. A paper was read by Dr. F. W. Alexander, M.O.H., Poplar, entitled "Sanigado per la Mara akvo kaj la Elektro" (sanitation by means of sea water and electricity), and others by Dro Nemser (el Peterburgo), Dro Robin (el Varsovio), Dro Rothschuh (el Aachen), Dro Sidlovskij (el Moskvo). The President expressed his conviction that, as the experience of the meeting had shown, Esperanto was suitable for the discussion of technical subjects. A reception was held at the Esperanto Club, St. Bride's Institute, St. Bride's Lane, Ludgate Circus, which was attended not only by a number of the members of the Congress speaking Esperanto, but by others who were disposed to study the utility of the tongue.

VISITS TO HARROGATE AND BATH.

NEARLY two hundred members of the Therapeutic and Dermatological Sections of the Congress visited Harrogate as the guests of the Corporation on Sunday. The party was met at the station by Mr. H. J. Buckland (general superintendent of the wells and baths department), by whom they were conducted to the Royal Baths, where they were received by the Chairman of the Wells and Baths Committee (Mr. J. Sheffield), who welcomed the visitors on behalf of the Mayor (Mr. J. S. Rowntree) and the Corporation. Dr. Shepherd Boyd, President of the Harrogate Medical Society, said that Harrogate had made considerable progress during the past few years. Its great ambition was to be in friendly rivalry with the mother spas of the Continent. He hoped that in the near future Harrogate would not only be the greatest of British spas, but a leader of the great centres of international spa treatment in the interests of suffering humanity. Professor Smithells, of the Leeds University, who is directing a scientific survey of the Harrogate waters, gave a short account of the geological origin of the waters, and of their general chemical character. He said that the quantity of the dissolved matter and the consistency of composition of the springs indicated that they flowed through a very long course, and over a large area, and gave promise that the supply would be maintained indefinitely. The old sulphur well had hardly varied in composition from the date of its careful analysis by A. W. Hofmann in 1853 to the present time. The radio-activity of the waters and the actual amount of radium were undergoing measurement in the university, under the supervision of Professor Bragg. Dr. David Brown (Honorary Secretary and Treasurer of the Harrogate Medical Association) gave an interesting account of the pharmacology and therapeutic indications of the sulphur, chalybeate, and saline springs, over eighty in number, and detailed the classification of the various baths. The visitors were then conducted over the Royal Baths, when the various treatments were explained by members of the Harrogate Medical Society. The party afterwards inspected the Victoria Baths, the old sulphur and other pump rooms, and places where treatments were given, also the Bogs Field, containing the mineral springs.

On Wednesday a party of 200 journeyed by special train to Bath. Within half an hour of arrival the visitors had sampled the waters in the Pump Room and were being instructed in all the mysteries of the bathing establishment. A number of boys acted as dummies for demonstration purposes, and were seen luxuriously taking the various baths and exercises, and douches, and massages, and sprays, and radiant-heat applications which figure in the now formidable list of hydropathic treatments. Afterwards luncheon was served in the banqueting chamber of the Guildhall under the presidency of the Mayor, Mr. G. T. Cooke, who said that in rubbing shoulders with each other the members of the Congress were rubbing out the lines of national demarcation, although in regard to medicine and science these lines had never been very sharp or deeply cut. Lord Alexander Thynne, M.P., in endorsing the welcome, said that Bath, in spite of its venerable age, was in the infancy of its development. There was a determination in the city to develop it as a national asset, so that it might take the place among the spas of the world to which it was entitled by the quality of its waters. There was a many-tongued response to the toast of the International Congress. First came Surgeon-General Sir Pardey Lukis, I.M.S. Then Dr. Tourtelot moved the French visitors to enthusiasm as, with native expressiveness, he said that the welcome to Bath was the climax to the kindness they had received in England. Professor Dr. Fritz Strassmann, in the name of the German members present, put on record their gratitude for the hospitality, and added that it was the feeling of his countrymen that the London Congress had been an immense success. Professor H. Burger of Amsterdam said that the Congress was the best organized ever held; Professor Giuseppe Gradenigo of Turin added a few congratulatory sentences; and Britain beyond the seas found a voice in the speech of a Canadian visitor, Dr. J. T. Lewis. The prosperity of the hot mineral springs of Bath was toasted, on the proposition of Dr. Robert Abbe of New York, who described the recent discovery of radium emanation in the Bath waters as the rechristening of the spring. So far as he knew, no other waters coupled such high thermic value with the presence of radium. The unknown radium was undoubtedly the factor which had worked the miracles of the past. In view of the inevitable future of the Bath spa, its resources seemed to him inadequate. In America, when they found health-giving waters, they built there largely and spaciously and confidently. Science having rechristened it, Bath must be built again, and built bigger. The toast was drunk with enthusiasm. The visitors were afterwards taken on a motor trip

through part of the Limpley Stoke valley to the village of Claverton, returning to the Roman thermae for a reception by the local members of the medical profession. To the thoughtfulness of these gentlemen, fifteen or more in number, throughout the day and previously, the party was greatly indebted. Their kindness was such that one of the American visitors expressed the hope that they would not suffer from hypertrophy of the heart.

GENERAL MEETINGS.

THE ADDRESS IN SURGERY.

ON Thursday, August 7th, the Address in Surgery, fully reported in the last issue of the JOURNAL (p. 286) was delivered by Dr. HARVEY CUSHING, Professor of Surgery in the University of Harvard.

At its conclusion, the President of the Congress, Sir THOMAS BARLOW, thanked Professor Cushing for his most remarkable address, which he did not hesitate to say was one of the most splendid apologias for the position of modern medicine and surgery which had ever been delivered. He hoped it would be one of the outcomes of this Congress that the remains of the old jealousy between surgery and medicine would be buried for ever. (Applause.) This happy result would be obtained if it were remembered that the true means of bringing it about was the broadening and deepening of medical education. Each one should learn more of the point of view of his brethren. The argument of the address, if rightly acted upon, would give the death-blow to all narrow specialism. Professor Cushing had drawn attention to the enormous change in the lay attitude towards vivisection. There was now gratifying proof that enlightened laymen and women realized the importance of many methods of inoculation and vivisection to the human race. He appealed to each member of his audience to take every opportunity of bringing home to intelligent laymen the truth that the steps between scientific investigations and their direct utilitarian application to the benefit of mankind were not single steps, but a series, and in the early stages their direct utility was not always obvious. Some of them might have been staggered by the views Professor Cushing expressed as to the relation of the hospital to modern education, but he was sure those views would receive the most patient attention, and that the problems Professor Cushing had forecast would be very thoughtfully considered.

THE ADDRESS IN PATHOLOGY.

On August 8th Professor PAUL EHRLICH, Director of the Royal Institute of Experimental Therapy at Frankfort-on-Main, delivered the Address in Pathology reported at p. 353. of this issue of the JOURNAL.

In thanking Professor Ehrlich at the close, Sir THOMAS BARLOW observed that the address had been a remarkable exposition of researches which were protracted, incessant, and not altogether free from risk. All would unite in desiring, for the sake of humanity, that Professor Ehrlich's health and life might be long preserved to add to these most important researches. His name might be inscribed on the same roll of fame as those of Pasteur, Lister, Koch, and von Behring. (Applause.)

THE ADDRESS ON HEREDITY.

At the general session, held in the Jehangir Hall of the University Buildings, on August 11th, Professor W. BATESON, F.R.S., Director of the John Innes Horticultural Institution at Merton, Surrey, gave an address on heredity, which is printed at p. 359. There was a large audience, and the lecture was illustrated by means of lantern slides and an array of horticultural specimens.

In thanking Professor Bateson at the close, the PRESIDENT OF THE CONGRESS said that his extremely lucid discourse must make every listener feel that inquirers were only on the threshold of a subject which might prove of momentous importance to the work of tracing the primary history of disease, and certainly also momentous as affecting the opinions medical practitioners felt it right to express to those to whom they stood in the relation of advisers on matters concerning future conduct. He firmly hoped that the note of sanity, extreme care, and conscientious balancing of the whole of the phenomena and their interpretation which marked Professor Bateson's address would be borne in mind by all who discussed this subject. If once extreme and extravagant attempts were made to put into definite concrete practice—into regulations and so forth—the principles adumbrated by students of heredity, the nation might land itself in disaster. Let there be the most careful study of heredity and of the natural history of disease in all its relationships, and very thorough consideration, before attempts were made to embody the conclusions in legislative form. The Mental Deficiency Bill, of course, needed no commendation. One of the great advantages of that measure, and the legislation in connexion with it, would be that the spirit of conscientious and industrious inquiry would be fostered, and would bring forth much fruit for future generations.

ADDRESS ON PUBLIC HEALTH.

On August 12th Mr. JOHN BURNS, President of the Local Government Board, gave an address on public health, which is reported at p. 362 of this issue of the JOURNAL. Having read his address, Mr. Burns concluded by saying that the invitation to address the Congress had given him great pleasure. As an artisan, made minister of public health by the confidence of his fellow countrymen, he took the opportunity of expressing, on behalf of the great army of industrial workers, appreciation of the devotion of the medical profession to the sick, halt, maimed, and suffering. When the members of the Congress returned home, might they continue to be inspired by the great ideals of the profession of which they were votaries, and combine with the exalted skill of a Lister the noble spirit of a Shaftesbury.

Sir THOMAS BARLOW, the President of the Congress, asked the audience to join him in an expression of gratitude to Mr. Burns for the masterly historical review of public health that he had given. It must have struck every one present that the country was happy in having a Minister at the Local Government Board who had such warm sympathy with the advance of medicine, not only in relief of sickness and suffering, but in diagnosis and scientific work, which was the foundation of it all. (Applause.)

CLOSING MEETING.

The closing meeting of the Congress took place in the Albert Hall at 4 p.m. on August 12th, the President, Sir THOMAS BARLOW, in the chair.

The Next Congress.

The report of the General Secretary of the Permanent Commission of International Congresses of Medicine (Professor H. BURGER) was read in French. The report stated that at its meeting on August 8th the Commission unanimously decided to accept the invitation of the Bavarian Government and of the Municipality and University of Munich to hold the next International Congress in that town in 1917.

Award of Congress Prizes.

The Commission accepted the recommendations of the committees appointed to award the Congress prizes as follows:

A.—The Moscow Prize, awarded to Professor Charles Richet of Paris for his work on anaphylaxis.

B. The Paris Prize, awarded to Professor A. von Wassermann, of Berlin, for his work on experimental therapy and on immunity.

C. The Hungary Prize, awarded to Professor Sir A. E. Wright, of London, for his work on anaphylaxis.

RESOLUTIONS.

It was reported that at its meeting on Monday, August 11th, the Permanent Commission of the International Congress of Medicine had elected the Committee as follows:

President: Professor Dr. Friedrich von Müller, of Munich (President-elect for the Eighteenth Congress).

Vice-Presidents: M. Calman Müller, of Budapest (President of the Sixteenth Congress); Sir Thomas Barlow, of London (President of the Seventeenth Congress).

Secretary-General: Professor Dr. H. Burger, of Amsterdam.

Assistant Secretary: D.Ph. van der Haer, of The Hague.

Member: M. L. Dejace, of Liége (President of the International Association of the Medical Press).

The Permanent Commission invited the meeting to approve of the following resolutions sent up by Sections of Congress.

A. *Venereal Diseases.*

By the combined Sections of Dermatology and Syphiligraphy and Forensic Medicine:

That, sensible of the ravages wrought by syphilis in the health of the community, and deploring the inadequacy of existing facilities for checking its dissemination, the International Medical Congress calls upon the Governments of all the countries here represented—

1. To institute a system of confidential notification of the disease to a sanitary authority, wherever such notification does not already obtain.
2. To make systematic provision for the diagnosis and treatment of all cases of syphilis not otherwise provided for.

B. *Beri-beri: Undulant Fever.*

By the Section of Tropical Medicine and Hygiene:

1. The Section is of opinion that beri-beri among natives who live principally on rice is brought about by the continuous and too exclusive use of rice submitted to a too complete milling, which removes the cortical and subcortical layers of the grain.
2. The Section urges all authorities charged with the health of native communities to restrain by every means in their power the use of this rice in the dietary of coolies.
3. In view of the proved non-infectiousness of beri-beri, the Section suggests that all port and sanitary authorities should abolish foreign quarantine and other restrictive measures against this disease.
4. The Section resolves that the malady known hitherto under the name of Malta fever shall in future be named "undulant fever."

C. *Experiments on Animals.*

The following resolution sent up by a number of Secti :

That this Congress records its conviction that experiments on living animals have proved of the utmost service to medicine in the past, and are indispensable to its future progress. That accordingly, while strongly deprecating the infliction of unnecessary pain, it is of opinion, alike in the interests of man and of animals, that it is not desirable to restrict competent persons in the performance of such experiments.

The resolutions were unanimously approved, and the report was adopted.

VOTE OF THANKS TO BRITISH MEMBERS.

The meeting also approved, by acclamation, the following resolution:

The Permanent Commission, considering that the hospitality of its English colleagues has surpassed all expectations, and considering that this gigantic Congress has been admirably prepared and organized, expresses its sincere and profound gratitude to the Committee of Congress and in their persons to the whole medical profession of England.

VOTE OF THANKS TO THE GOVERNMENT OF HOLLAND.

The PRESIDENT proposed a vote of thanks from the Congress to the Government of H.M. the Queen of Holland for generously defraying the expenses of the Permanent Commission. Sir Thomas Barlow remarked that it might not be generally known that the Government of Holland defrayed the expenses of the Commission during the periods between Congresses. The work done in the interval was of the greatest possible value, and it would have been quite impossible for the Congress to be so successful had it not been for the help rendered by the Government of Holland.

The resolution was carried by acclamation.

THE REPRESENTATIVES OF FOREIGN GOVERNMENTS.

The representatives of foreign Governments then bade farewell to the President, the proceedings following the lines of those at the opening meeting. The speeches, delivered in many languages, were full of expressions of appreciation of the organization and value of the Congress and of the "magnificent and unique hospitality" offered to the delegates.

PRESIDENT'S FAREWELL ADDRESS.

The PRESIDENT then bade farewell to the Congress, and closed the meeting. He said: It is now my duty to bid this Congress good-bye. It must have been abundantly evident to every thoughtful person attending these meetings that the influence of medicine and of medical practitioners is growing enormously. (Applause.) At no previous International Medical Congress has the Government of the country taken so warm and personal an interest in the work of the Congress; so far as I know, at no previous congress has one of the addresses been delivered by a member of the Government. In every possible way the Government has shown its interest in the work of the Congress, and this is the more noticeable because it is not usual for our Government to concern itself specially in the work of congresses of this kind. No thoughtful person can doubt that in the next generation we shall see an enormous advance in the importance of medicine; it is not a question of rank but of influence. You are well aware that the great commercial class has had a great influence in Europe in endeavouring—successfully at times—to prevent the extension of war. Surely, with the growing influence we possess, we ought to be able to influence our respective countries in this particular regard. (Applause.) I ask you to say is it conceivable, is it permissible, when we have assembled and discussed, without any question of race or country, the various problems of the scientific advance of medicine and its application to the relief of the sickness of humanity, that we should go back to our countries and make no effort to prevent the nations to which we belong from engaging in bloody strife? I do in these parting words beseech my brethren to make their undoubted influence felt in the direction of blessed peace. (Applause.) Now it is my duty to wish you "farewell." That English phrase, "Good-bye," has been translated "All good be with you." I will venture to retranslate it in the words of our Saxon fathers, and say, "God be with you." (Applause.)

THE INTERNATIONAL ASSOCIATION OF MEDICAL MUSEUMS.

A MEETING of this Association took place at the Royal College of Surgeons and the Imperial College of Science on August 5th, 6th, and 7th, during the International Congress of Medicine. There was a large and representative international attendance.

The meeting was opened by Professor ARTHUR KEITH, Honorary President, who, as Chairman of the Museum Committee of the Congress and Curator of the Museum of the Royal College of Surgeons, welcomed the members to London.

PRESIDENT'S ADDRESS.

The President (Professor A. S. WARTHIN, of Ann Arbor, Mich.) gave an address upon the ideals and functions of the International Association of Medical Museums. He said the association had entered upon its seventh year of existence, and this was its second triennial international meeting. During that time it had grown from small beginnings to a membership of over two hundred, including the leading pathologists and anatomists throughout the world. It was an association of medical museums, its scope extending beyond pathology into all the fields of medicine, particularly in the direction of preventive medicine and hygiene. At the present time there was a strong demand for a museum of preventive medicine on a popular basis, such as was illustrated by the travelling museums of the campaign against tuberculosis. The organization of such popular museums and the discussion of methods of demonstrative teaching of all kinds should be among the special functions of this association. The need for a society in which medical teaching in general, both demonstrative and otherwise, could be considered was pointed out, and the plea made that this society might

widen its scope to include this field. The most important side of the association was its international character, and at this meeting the organization of the international body and of its local or sectional societies was to be thoroughly worked out.

Discussion.

Sir WILLIAM OSLER opened a discussion on the improved organization of this association on the international basis. He prefaced his remarks by a tribute to the memory of the late Sir Jonathan Hutchinson, whose recent death had removed one who had been for many years a pioneer worker in the field of medical museums, a collector in the most scientific sense whose remarkable breadth of interest and clearness of intellect made him a demonstrative teacher of the highest type. Especially in connexion with the formation of the popular museum, which Dr. Warthin had rightly described as one of the special functions of this association, the life-work of this great man was of interest, and all those who could visit his wonderful popular museum at Haslemere would learn there the results which careful classification of well-chosen material along any line could bring. Returning to the subject of the discussion, Sir William expressed his belief in the usefulness of the Museums Association as an international association of exchange of material and of discussion of methods both of technique and of demonstrative teaching. There were difficulties, of course, such as the geographical one, in its international development, but the plan suggested, of a central bureau which would control the different branches in various countries and hold triennial meetings in the country where the International Medical Congress was held was, he thought, practicable. Each country should possess a certain amount of autonomy in managing its own society, and under these conditions a highly useful work could be carried on.

Professor LUDWIG ASCHOFF (Freiburg) saw no difficulty in the international organization except as regards the international fee, which should be reduced somewhat as soon as the membership increased sufficiently to justify this. He recommended that a propaganda for the extension of membership should be instituted by the local societies in the various countries, and to this end that copies of the President's address be translated and circulated.

Recommendations.

Professors SPALTEHOLZ (Leipzig), W. G. MACCALLUM (New York), J. G. ADAMI, F. J. SHEPHERD (Montreal), and others joined in this discussion, and the following recommendations for the international organization were adopted:

1. There shall be a central international body with international officers and local or sectional societies with local officers, one society for each country represented.
2. The meetings of the international body shall be held at the same place and time as the meetings of the International Congress of Medicine. The meetings of the sectional societies shall be held annually or more frequently, according to the decision of the individual society.
3. The officers of the local societies may be elected annually or triennially, and shall consist of a President and Secretary and as many other officers as the local society shall decide. The officers of the International Association shall be as provided under the present constitution. They shall be elected triennially at the international meeting for the ensuing triennium and for the next international meeting, except the Secretary, whose position shall be permanent. The President shall, whenever possible, be elected from that country where the next international meeting will be held.
4. A local fee may be arranged at the discretion and option of the local society, but the international fee shall remain 2 dollars. It shall continue to be paid to the International Secretary and shall be devoted to the cost of the Bulletin, the payment of international postage, and other international outlay.
5. The meetings of both the International Association and also of the sectional societies shall be reported in the Bulletin, and all communications presented at all such meetings shall be available for publication in the Bulletin. This will not preclude their publication elsewhere as well, nor is the Editorial Committee pledged to publish all papers presented at either the international or sectional meetings.

International Congress and the Association of Medical Museums.

Mr. H. W. ARMIT, Secretary of the Museum Committee of the Congress, dwelt upon the relation which such an association as this might have to the meetings of the International Congress of Medicine. After a prolonged experience in the organization of Congress Museums, the conclusion had been forced upon him that efficiency was sacrificed, much time was lost, and valuable experience wasted by placing the arrangements at each Congress in the hands of a new set of comparatively untrained persons. The International Association of Medical Museums was a society of museum experts, and seemed peculiarly fitted to undertake the organization of the Congress Museum as a whole. It was therefore resolved: on the motion of Mr. ARMIT, seconded by Professor KEITH,

> That in future the organization of the Museum of the International Congress of Medicine be entrusted to the International Association of Medical Museums.

The Secretary was instructed to write to the Secretary of the Standing Committee of the Congress communicating the resolution to him, and requesting that the Executive of the association be put in communication with the National Committee or Government of the country where the next meeting of the Congress would be held.

Election of Officers.

The following officers of the international body were elected:

President: Professor Ludwig Aschoff, Freiburg.
Vice-Presidents: Professor Arthur Keith, London; Professor Pierre Marie, Paris; Professor R. M. Pearce, Philadelphia.
Treasurer: Dr. Maude E. Abbott, Montreal, Canada.
Councillors: Sir William Osler, Bt., England; Professor J. G. Adami, Canada; Professor A. S. Warthin, United States; Professor Bernard Fischer, Germany; Professor Paul Courmont, France; Professor J. Fibiger, Denmark; Professor Harbitz, Norway; Professor Askanazy, Switzerland; Dr. de Josselin de Jong, Holland; Dr. René Sand, Belgium.

The Dutch members present declared the following local officers elected for the local Holland section:
President: Dr. Georgine Luden van Heumen.
Secretary: Dr. Ariens Kappers.
Vice-President: Dr. de Josselin de Jong.

A hearty vote of thanks was tendered to Dr. Arthur Keith and Mr. H. W. Armit for their courteous and efficient co-operation in the arrangements for the London meeting.

Papers and Demonstrations.

A very interesting programme, consisting of papers and demonstrations along the lines of museum and microscopic technique, was successfully carried out.

Professor SPALTEHOLZ (Leipzig) demonstrated an extremely beautiful series of preparations of various organs and tissues rendered transparent by a method original with him, whereby the finest details of internal structure are revealed. Dr. R. A. LAMBERT (New York) gave a lantern-slide demonstration illustrating the staining of living tissues cultivated *in vitro*. Dr. C. F. SILVESTER (Princeton, New Jersey,) demonstrated methods of mounting very delicate material by attaching the specimen by means of glass pins to sheets of wax. A new method of maceration and teasing was given by Professor G. C. HUBER (Michigan, U.S.A.,) by means of which he has been able to isolate the entire renal and seminiferous tubules; new forms of cement for sealing museum jars were announced by Mr. W. MUIR and E. L. JUDAH, Montreal, Canada, and Dr. COBURN, of Pittsburg, U.S.A. A most interesting discussion on the staining of nerve fibres and cells occupied the greater part of Thursday's session, new and valuable methods being announced by Dr. GEORGINE LUDEN VAN HEUMEN (Munich), Dr. C. A. U. KAPPERS (Amsterdam), and Dr. RENÉ SAND (Brussels). Professor ADOLPH MEYER of Johns Hopkins University showed three beautiful glass reconstruction models of the human brain. Professor WAHBY (Cairo, Egypt) demonstrated very fully his methods of corrosion, by which the finest ramifications of the body cavities and the vascular system can be demonstrated. Other papers presented were relative to exhibits in the Section of Museum Technique of the Congress Museum, by Dr. E. C. ROSENOW (Chicago), representing the pathology and etiology of endocarditis; Professor DELÉPINE (Manchester), illustrating various types of infectious diseases, and Dr. A. A. BRUERE (Montreal), showing mounted colonies of fungi in gelatine plate cultures sealed with paraffin.

Medical Notes in Parliament.

Public Health (Prevention and Treatment of Disease) Bill.

THIS short but highly important bill passed through Committee on Tuesday, August 5th, and was read a third time on August 6th. The fourth clause of the bill was dropped, and the first three clauses (which confer considerable powers on county councils) were passed in the following form, the amendments being indicated in the italicized:

1. Notwithstanding the provisions of section two hundred and eighty-one of the Public Health Act, 1875, the Local Government Board may by order authorize a local authority having jurisdiction in any part of a united district to exercise in relation to that part any powers which the joint board are also authorized to exercise, subject, however, to such conditions and restrictions as may be imposed by the order.

2. The Local Government Board shall have power to declare that one of the authorities to execute and enforce regulations made by the Board under Section 130 of the Public Health Act, 1875, with a view to the treatment of persons affected with cholera or any other epidemic, endemic, or infectious disease, and preventing the spread of cholera and such other diseases, shall be the council of a county, and that Section shall have effect accordingly as if a county council were an authority within the meaning of that Section. *Provided that, except in case of emergency, the Local Government Board shall not require the council of a county to execute and enforce any such regulations without the consent of such council.*

3. (1) It shall be lawful for the council of any county or *any sanitary authority* to make any such arrangements as may be sanctioned by the Local Government Board for the treatment of *tuberculosis, provided that the powers conferred by this Secteon shall be in addition to and not in lieu of any other powers.*

(2) Any expenses incurred *under this Act* shall, in the case of a *sanitary authority*, be defrayed as part of the expenses incurred by them in the execution of the Public Health Acts, and in the case of a county council as expenses for general county purposes, or if the Local Government Board by order so direct, as expenses for special county purposes charged on such part of the county as may be provided by the order.

The bill has also been passed by the House of Lords.

Mental Deficiency and Lunacy (Scotland) Bill.

This bill passed through the Report and third reading stages in the House of Commons on Thursday, August 7th. A large number of drafting amendments and amendments promised in Committee, and some new clauses, were moved by the Secretary for Scotland or the Lord Advocate, and approved.

The bill was taken after 1 a.m., and the third reading was taken without a division, after a protest by Mr. Wedgwood in respect of the proceedings of the House on that occasion, which he described as a legislative farce. A new clause, dealing with the protection of lunatic women and girls, is in the following terms:

The Section of this Act relating to the protection of defectives from acts of sexual immorality shall have effect for the protection of women or girls who are lunatics duly certified as such under the Lunacy Acts, and while they remain so certified, with the substitution of such women or girls for defective women or girls, of an asylum or other place of lawful detention for lunatics for an institution or certified house, of pass or probation for licence, and of the Lunacy Acts for this Act.

The clause relating to the power to subscribe to pathological investigations is in the following terms:

District boards shall have power, with approval of the Board, and for the purpose of obtaining instruction and assistance in pathological investigation for the medical officers of asylums under their charge, to contribute annually towards any pathological laboratory, having for its object or one of its objects investigation into the pathology of mental diseases, and such contributions shall be paid out of the assessment authorized under the Lunacy Acts and this Act.

The bill was in the House of Lords on August 13th, when a new clause bringing institutions already licensed under the Lunacy (Scotland) Act within the scope of the bill was added on a motion of the Lord Chancellor, as was also a new clause providing for the visits of parents or guardians to defectives in institutions, moved by the Marquis of Salisbury. The bill was read a third time and passed.

Highlands and Islands (Medical Service) Bill.

This bill passed through Report and third reading shortly after 2 a.m. on Thursday, August 7th. A large number of amendments had been placed on the order paper by members, evidently as a protest against the extension of the provisions of the bill beyond the Highlands and Islands, and a number of obscure villages and hamlets were mentioned. Ultimately, however, the only addition to the Schedule which was made was the Highland District of the County of Perth as at present constituted under the terms of the Local Government Act (Scotland), 1889. Mr. McKinnon Wood said that the Highlands of Perthshire had been mentioned in the Committee's Report, but that he was not able to go beyond that at present. He added, however, the following important statement:

I may say that I have had a communication with the Chancellor of the Exchequer, and that the Government recognize there are other necessitous parts of Scotland, although they are partly dealt with by the mileage grant already given, and it is proposed that those other parts of Scotland which would come under the description, but which could not possibly be put in this bill, shall be considered, and that the necessary money for dealing with them shall be provided next year. I have the authority of the Chancellor of the Exchequer for making that announcement, and I understand it will meet the view of my colleagues in the representation of Scotland.

The bill passed through Committee of the House of Lords on August 13th.

Elementary Education (Defective and Epileptic Children) Bill.—This bill was read a second time on Thursday, August 7th. It was stated by Mr. Pease that he hoped to arrive at an agreement with those who offered opposition to some of its provisions, and that he would table his amendments without delay. They would, he trusted, be satisfactory to all.

Mental Deficiency Bill.—On Monday afternoon, on the motion to go into Committee on the Mental Deficiency Bill, the Archbishop of Canterbury protested against the large number of amendments which had been put down by the Government, and at so late a date that there had been no time to consider them. The Lord Chancellor admitted the justice of this criticism, but appealed to the House to save the bill. After a further protest by the Marquis of Salisbury and a reply by the Marquis of Crewe, the House went into Committee on the bill. A number of amendments, many of them of a drafting character, were made in the earlier clauses. On Clause 11, fixing the duration of detention under orders, the Marquis of Salisbury moved an amendment providing that on the question of the renewal of an order the Board of Control should consider not only the special report and certificate referred to in the bill, but also the report of any duly qualified medical practitioner who, at the request of the defective, or his parent or guardian, or any relative or friend, had made a medical examination. He desired that there should be an opportunity for an independent medical practitioner to visit the defective person. The Lord Chancellor said that under the bill power was reserved to the Board to order such a visit. The Lord Chancellor would retain the same power which he now not infrequently exercised under the present law. In further reply to Lord Selborne, he said that in every case in which a parent applied to the Board of Control or the Lord Chancellor, and in which the application was not unreasonable, authority would be given to an independent medical practitioner to visit the person detained; that was provided in the bill. The Marquis of Lansdowne urged that the amendment should be accepted on the ground that poor people might easily be discouraged from taking steps necessary to secure the visit of an independent doctor if any obstacle were placed in their way. The Bishop of Oxford expressed the hope that it would be found possible to accept the amendment without risking the bill; and the Lord Chancellor, while thinking that what was desired was secured by the bill, accepted the amendment, which was agreed to. A considerable number of Government amendments, as well as a number of others, were not moved or were withdrawn, and eventually

the Committee stage was concluded and the bill reported as amended to the House. On August 12th a number of amendments were agreed to, among others one moved by the Marquis of Salisbury making provision for the visits of relatives or guardians to a defective person detained in an institution. A number of drafting amendments were adopted, and the bill was read a third time and passed. The House of Commons on August 13th agreed to the amendments.

London Ambulances.—Lord Leigh rendered a great public service by calling attention, in the House of Lords on August 6th, to the present unsatisfactory position of the ambulance arrangements for street accidents in London. The occasion was the third reading of the London County Council General Powers Bill, which embodied an obscure clause enabling some sixty Poor Law and municipal bodies in London to agree with the London County Council to utilize any conveyances they might possess for the purpose of picking up persons injured in the London streets. Lord Leigh reminded their lordships that in 1909 Parliament, by a public statute, authorized the London County Council to supply the county area with an efficient motor ambulance service, summonable by telephone calls, similar to that which has worked so smoothly and beneficently in the City of London. After much unnecessary delay the Council had at length begun to put that Act in operation, and was now maintaining in the north-west of London a motor ambulance, the gift of the Grand Duke Michael of Russia. Complaints had already appeared in the public press to the effect that if such ambulance maintenance was good for well-favoured Hampstead it would not be bad for other and more crowded parts of the metropolis where street casualties were more frequent, and where, in default of more appropriate means of conveyance, sufferers were still put into cabs or vans, or leisurely wheeled along in litters attended by a too solicitous crowd. Lord Leigh inquired what these new powers sought by the County Council on behalf of other bodies in its private bill really implied. Was it an attempt to rid themselves of their responsibilities and duties under the Metropolitan Ambulances Act, 1909? Were cabs used for conveying paupers or ambulances for carrying fever and small-pox cases to be pressed into the Council's service for handling street accidents? Lord Welby supported Lord Leigh, and emphasized the impracticability of any such scheme. Central organization was of primary importance in securing efficiency and in properly organizing and controlling any such municipal service as this. Lord Mayo was perturbed at the possibility of adding the risks of contagion to the misfortunes of any sufferer knocked down by taxi-cabs in London streets. Stress was laid upon the alarming increase of accidents since the advent of motor vehicles and the utterly inadequate means at present available for the removal of the sufferers to hospital or to their homes. Lord Dunmore, who spoke on behalf of promoters of the bill, assured their lordships' House that "there was nothing in the clause which relieved the County Council of the obligations imposed on it by the Act of 1909." He pleaded the expense which would be entailed by at once extending the city's scheme to the whole of the county, and added that the borough councils favoured the proposals in the County Council's bill. His lordship appeared to be unaware that the two city stations with this elaborate telephone call system are now maintained for £1,700 a year, which includes a heavy rental to the Postmaster-General for the call-posts; and that the borough councils appealed to the London County Council in the first instance to undertake this service nearly ten years ago. It has been estimated that some ten self-contained motor ambulance stations, suitably distributed over the county area, would supply London, or the greater part of it, with a really efficient service, and that even without the special call-posts, as in the city, a fairly efficient telephone summons scheme might be arranged at very little expense. We are aware that the London County Council, although a large proportion of its members are pledged to put the Act of 1909 in operation, is an ardent devotee of economy, and this, it would appear, is at the bottom of this ambiguous proposal. Like a certain American statesman, they are "in favour of the Act but against its enforcement." Any way, the debate in the Lords has been valuable and opportune. We now know that the County Council has no intention of going back on the Act of 1909, does not seek any amendment to it, nor intend to shuffle out of its responsibilities thereunder. Lord Leigh's intervention at the eleventh hour—for the bill had passed the Commons—was a timely public service, and will doubtless tend to stimulate the County Council into activity.

Experiments on Animals.—Mr. Wedgwood asked the Secretary of State for the Home Department whether he could see his way to afford the special protection which was now given to horses, asses, and mules to dogs and cats, as recommended by the majority of the recent Royal Commission; whether the recommendation of the Commission as to pithing had been carried out; and whether special records of experiments were now required, as recommended by the Commission.—Mr. McKenna said he had given his best consideration to the remarks of the Commission on the first subject—they were so qualified that they could hardly be described as a "recommendation." He was advised that legislation would be necessary to require a special certificate for experiments on dogs and cats where the experiments were carried out wholly under anaesthetics; where the experiments were not wholly under anaesthetics a certificate was now required. He had accepted the recommendations of the Commission as to pithing and special records of experiments, and they were being carried out. In reply to Mr. Wedgwood, Mr. McKenna said that the Advisory Committee appointed in accordance with the recommendation of the Royal Commission to assist him in the administration of the Act had the names of all applicants for appointments as inspectors referred to them to report, and advised him in the selection of the best candidates.

Inoculation Experiments.—In reply to questions by Mr. Lynch, Mr. Burns said that his attention had been called to recent researches abroad, but that the establishment of any system of inoculation against anterior poliomyelitis was not practicable at the present time, as no reliable protective serum had yet been prepared. Mr. Burns also said that, as at present advised, he was not prepared to set on foot a national system of inoculation in respect of tuberculosis, typhoid fever, diphtheria, and certain other diseases, of which the specific germ was known. The order issued by the Local Government Board in 1910 gave power to local authorities under certain conditions to supply diphtheria antitoxin and medical assistance in connexion therewith.

Sight Tests.—In reply to Major White, who asked a question as to the resolution with regard to sight tests adopted by the Ophthalmological Section of the British Medical Association at Brighton, the Parliamentary Secretary to the Board of Trade said that, though he had seen a statement in the press to the effect that such a resolution was carried, the Board had not yet received a communication from the Association. [With regard to this reply, we may point out that resolutions adopted in a Section of the annual meeting are of the nature of recommendations to the Council, and that the Council will, no doubt, communicate with the Board of Trade after considering the matter at its next meeting.]

Medical Staff of the Factory Department.—In reply to Mr. O'Grady, the Home Secretary stated that one medical inspector was being added to the staff, making three medical inspectors in all. Medical men were also appointed under the Act and regulations throughout the country for the purpose of examining children and young persons, inquiring into accidents and poisoning cases, and examining workmen in certain dangerous industries; the number of those medical men was 2,118. A worker injured by accident was not required by the Compensation Act to obtain any medical certificate for the purpose of making a claim for compensation. A worker suffering from an industrial disease had to obtain a certificate from the certifying surgeon, but the fee was only 1s. in cases where the certifying surgeon gave the certificate on the result of the examination made by him in pursuance of

his duties under the Factory Act, and 5s. in other cases; if the worker were refused a certificate and appealed to the medical referee, the referee's fee was paid by the State. He had no evidence to show the need for any change in the system.

Employment of Women and Girls in Factories.—In reply to Mr. Morrell, asking the Home Secretary a question as to the employment of women and girls in factories and workshops, Mr. McKenna said that the latest figures available were those for 1907, as the tabulation of the returns for 1912 was not yet completed. In 1907 the total number of women and girls employed in factories and workshops was a little over 1,850,000. The authorized number of women inspectors was now twenty, two having been added during the present year. No additions were made in the years 1909 to 1911, but five were added in 1908 and three in 1906, so that in the last seven years the staff had been exactly doubled. During the same period the ordinary male inspecting staff (as distinct from inspectors for special purposes) had been increased from 135 to 182, an addition of forty-seven.

Factory Accidents.—In reply to a question by Mr. Morrell, who stated that the fatal accidents in factories and workshops had increased from 422 per annum to 945 in the course of the last twenty years, and that the number in 1912 was higher than ever before, Mr. McKenna said that the increase in the number of accidents in factories was thoroughly investigated by the Accidents Committee, and was discussed at length in its report, issued in 1911. It was impossible to deal with the subject in reply to a question. The matter was dealt with in the Annual Report of the Chief Inspector. The Department was busily engaged in carrying out the various measures recommended by the Committee, so far as it was possible to do so without legislation.

Accidents in Coal Mines.—Mr. McKenna, in replying to Mr. Outhwaite, gave the following statistics of the number of men and boys killed and injured in coal mines during the year 1912:

	Killed.		Injured.*	
	Men.	Boys.†	Men.	Boys.†
United Kingdom ...	1,204	71	140,185	10,285
Staffordshire	77	5	6,924	362

* Accidents disabling for more than seven days. † Under 16.

Poor Law Medical Service.—Mr. Ginnell asked the Secretary to the Treasury if he would say to what amount annually the cost of the Poor Law Medical Service in England and Wales was paid by Exchequer grants; this being in the circumstances an equivalent to the amount spent on the Poor Law Medical Service in Ireland, whether Ireland's share of the 2s. 6d. per head increased expenditure for the better working of the National Insurance Act on the 800,000 persons whom the Irish Commissioners expected to have insured presently was £100,000, instead of the £50,000 offered; having regard to the distances which country doctors in Ireland had to travel, and that they were not to benefit from the proposed extension of medical benefit to county boroughs in Ireland, whether they would be paid the 2s. 6d. per head to which the existing law entitled them as in England and Wales; and, if not, would he, for their information, state the reasons.—Mr. Benn said that the points raised in the first part of the question were matters for argument which he was afraid he could not carry further than he had done in his previous replies upon the subject. In the second part the fact appeared to be ignored that the payments in Great Britain to which he referred were payments not by way of endowment of the medical profession, but for services rendered in connexion with medical benefit under the National Insurance Act (a benefit at present confined to Great Britain). The question of an increase in the grant of £50,000 in respect of expenses arising on account of the absence of medical benefit in Ireland was under consideration.

Proposed Inquiry as to Venereal Diseases.—In reply to Dr. Esmonde and Dr. Chapple, the Prime Minister said that the Government had agreed to institute an inquiry on the public health aspect of venereal diseases. Its precise terms and scope and the character and composition of the body to be set up were still under consideration.

Reports on Universities and University Colleges.—Mr. J. A. Pease informed Mr. Mount that the reports from universities and university colleges for the session 1911–12 would be published in about three weeks' time.

Ireland.

[*FROM OUR SPECIAL CORRESPONDENTS.*]

Medical Benefit in Ireland.

THE report[1] has been issued of the Committee appointed in February last to consider the advisability of applying to Ireland the provisions of the National Insurance Act, 1911, with respect to medical benefit, and as to alterations, legislative or otherwise, which, in the event of such provisions being applied, would be desirable in the systems for affording medical relief at the present existing. The constitution of the committee was as follows: Lord Ashby St. Ledgers (Chairman), Sir John Bradbury, K.C.B., of the Treasury, Mr. T. J. Stafford, C.B., F.R.C.S.I. (Medical Member of the Local Government Board for Ireland), Mr. Hugh T. Barrie, M.P., Mr. Joseph Devlin, M.P., Mr. J. A. Glynn (Chairman of the National Health Insurance Commission (Ireland), Mr. J. C. R. Lardner, M.P., Dr. W. J. Maguire (Medical Member of the National Health Insurance Commission, Ireland), Mr. W. L. Micks (Congested Districts Board for Ireland), Mr. John Houlihan (Secretary).

The recommendations appended to the report of the Committee, signed by Lord Ashby St. Ledgers (Chairman), Sir John Bradbury, Mr. Joseph Devlin, Mr. J. A. Glynn, Mr. James C. R. Lardner, and Dr. W. J. Maguire, are as follows:

Recommendations.

We recommend, therefore, that, unless terms can be arranged with the medical profession before a bill is introduced, the measure should simply provide for raising the rates of contribution in the six county borough areas to the English level, and that the proceeds of the additional rate, together with the special Exchequer grant of 2s. 6d. per insured person, should be paid over to the societies, who should be empowered to enter into arrangements for providing medical benefit either for members and dependants or for members only, if they see fit; or, failing such arrangements, to give other benefits to the value of the additional contributions.

The defining of the precise areas to which medical benefit is to be applied will require careful consideration. It is not, in our opinion, desirable to adopt the Local Government boundary, but to mark out in each case a special area which will include the whole industrial population for which the borough is the centre. Purely agricultural areas should as far as possible be excluded, but we doubt whether it would be practicable to exclude persons engaged in agriculture within the defined areas. Outlying industrial districts might, however, be annexed to the county borough areas, even though not actually contiguous. As these areas will not correspond with those of the Insurance Committees, this is a further reason for administering the benefits through societies rather than through Insurance Committees.

We also recommend that the provisions requiring the separation of arrangements for supply of drugs from those for medical attendance and treatment should not be applied, and that societies should be left free, if they see fit, to enter into inclusive contracts with medical practitioners in accordance with the common practice before the National Insurance Act came into operation. We are of opinion that this arrangement will meet the demand for the extension of medical benefits in the districts in which it is most persistent. It is not, however, suited to the requirements of the rural districts or

[1] [Cd. 6963.] Price 2d.

even to those of the smaller urban centres, nor do we think it will be found suitable as a permanent system even in the six county boroughs and surrounding areas, and we do not recommend it except as a provisional and interim arrangement pending the adoption of a general scheme of medical benefit for Ireland as a whole.

Such a general scheme will, we think, necessarily involve the creation of a State Medical Service. The establishment of such a service by the State, however, side by side with the existing dispensary service, would, even in the larger urban centres, necessarily result in overlapping and consequent waste of money, while in the rural districts it would be wholly impracticable. We think, therefore, that no steps can be taken in the direction of establishing a State Medical Service, except in conjunction with a comprehensive reform of the Poor Law, for which indeed, for other and wholly different reasons, the time is already overripe.

We are of opinion that the funds now available for the purposes of the Medical Charities Act, together with the further moneys which would be forthcoming if the contributions and Exchequer grants under the National Insurance Act were raised to the English level, would be sufficient not only to provide for Poor Law medical services proper, and give to the insured population and their dependants domiciliary medical treatment at least equal in quality to that provided for insured persons in Great Britain, but also to leave a balance available for other medical services (including nursing) not at present included in medical benefit under the Insurance Act. This we regard as the real solution of the present problem.

We have not considered in detail the arrangements necessary to give effect to this recommendation, nor, as already explained, have we taken evidence from the rural and smaller urban areas to justify us in putting forward specific proposals. It will be for His Majesty's Government to consider in the first instance what action, if any, shall be taken upon our interim proposals in regard to that part of the problem which is unquestionably the most urgent, and whether we should be invited to continue our inquiries with a view to the formulation of a general scheme.

Sir John Bradbury, though signing the report, appends a note stating that he was impressed by the urgency of the problem, and did not see any more satisfactory line of immediate action than that recommended, and adding that, except for the consideration of urgency to which he referred, he should have preferred to take no action at present, but to proceed at once with the formulation of a scheme for a general public medical service.

Mr. W. L. Micks, in the course of a note appended to the report, states that the question as to applying or not to Ireland the medical benefits section of the Insurance Act seemed to afford an ideal opportunity for preparing a scheme for a general medical service.

Mr. T. J. Stafford, C.B., states that, while he is in complete agreement with the main recommendation of the majority of the Committee that a national medical service for the whole country should be created, he is not in agreement with the temporary expedients proposed for providing medical benefits in the six county boroughs which make it a condition that the benefit should be available not only to the insured person but also to the dependants, and furthermore suggesting that the Act should be obligatory on the insured in those areas. He then gives his reasons for disagreeing.

Mr. Hugh T. Barrie, M.P., is unable to concur in the majority report, and he holds that in view of the failure to adjust terms with the medical profession which the societies from their present resources could afford to pay, it is undesirable that the medical benefits under the Insurance Act should meantime be extended to Ireland or to any part thereof.

Scotland.

[FROM OUR SPECIAL CORRESPONDENTS.

Co-operation between Edinburgh University and the Royal Infirmary.

THREE weeks ago reference was made in these columns (p. 206) to certain changes which had been carried out in connexion with the Pathological Department in the Edinburgh Royal Infirmary and the teaching of pathology in the university. It was then announced that Dr. Shennan, the present pathologist to the Royal Infirmary, had been appointed University Lecturer on Morbid Anatomy, and we understand that now the Professor of Pathology in the university is to be made Consultant Pathologist to the infirmary, and will have certain privileges in connexion with the material in the Pathological Department for teaching and research purposes. It has been further arranged that when the post of pathologist to the infirmary becomes vacant the managers of the institution shall, on certain conditions, appoint the Professor of Pathology thereto. On the other side, the university is to bear the cost of the enlargement and equipment of the Pathological Department.

Another change, also connected with the Professorship of Pathology, is in progress. The wards in the Royal Infirmary, which till recently were under the care of the Professor of Pathology, are now to be allocated to the Professor of Clinical Medicine, when his appointment by the University Court has been made.[1] Further, the wards which are now under the charge of the Professor of Materia Medica may, in the future, be dealt with in a similar manner, so that possibly a second Professor of Clinical Medicine may be appointed. Another and a more immediate change is the appointment of the four senior ordinary physicians in charge of wards in the infirmary to be "Senior Lecturers in Clinical Medicine in the University"; they are to have academical status, and to act as examiners in clinical medicine for the university degrees. Along with the addition thus made to the teaching staff of the university comes the recognition of the assistant physicians of the infirmary as "university lecturers," and the attachment to each medical charge in the infirmary of a "university clinical tutor," who shall assist in the teaching of the "side-room" work. The *Edinburgh Medical Journal* for August, which gives fuller details of these changes, accomplished or impending, suggests that, whilst so much is being done to improve the clinical teaching, something should be attempted to encourage research. The "Clinical Medical Board," which is to co-ordinate all the work on the medical side, might very well join with the corresponding "Clinical Surgical Board," which is to do the same for the surgical part of the infirmary, and form a "subcommittee of research," to give facilities for scientific investigation.

There is in existence a third department—that for gynaecology—which is to continue to stand by itself, for the Royal Infirmary, unlike many other hospitals, has no obstetric wards. Perhaps those who have been so successful in carrying through the above alterations might now turn their attention to a similar co-ordination of the work in the Royal Maternity Hospital (where the professor of midwifery in the university is one of the senior physicians) with the teaching of obstetrics in the university and with the clinical gynaecological work in the infirmary. Something also should be done to bring the ample clinical resources of the Royal Hospital for Sick Children into more complete and immediate use for the teaching of what is really a part, and an important part, of clinical medicine. All these changes will require time, but they are believed to be in the right direction and likely to secure increased efficiency.

Post-Graduate Teaching in Internal Medicine.

The August course on internal medicine in the Edinburgh post-graduate curriculum is now in full progress. It includes clinics on general diseases and on diseases of the lungs, heart, blood, and ductless glands; teaching on the examination of the heart; classes on the methods of blood examination, on *x*-ray diagnosis and electrical treatment, on the examination of the nervous system and of the digestive products and urine; demonstrations of medical applied anatomy; and instruction in bacteriological methods in relation to clinical diagnosis. Among those attending the course are graduates from the United States, Canada, New Zealand, South Africa, Ceylon, Naples, the Channel Islands, Tasmania, London, Liverpool, and elsewhere.

Clinical Demonstrations of Diseases of Pregnancy.

In connexion with the course of post-graduate teaching on internal medicine referred to above, Dr. J. W. Ballantyne is giving a series of four Saturday morning

[1] BRITISH MEDICAL JOURNAL, May 17th, 1913, p. 1089.

demonstrations of the diseases of pregnancy as seen and treated in the pre-maternity ward of the Edinburgh Royal Maternity Hospital. The first of the series was given on August 9th, and among the patients then shown was a woman, 43 years of age, who had been brought into the hospital as a case of spurious pregnancy. She had had twenty-three pregnancies since her marriage at the age of 18; nineteen of these had gone to the full term, although a large number of the children had died in the first days or weeks of life; there had been three abortions and a premature labour. Dr. Ballantyne termed her a "multi-multipara," and pointed out how the attempt to carry a child *in utero* and another at the breast at the same time had maleficent effects upon either the "internal" or the "external" child or upon both. It was a dislocation of the harmonious symbiosis of pregnancy, and the wonder was that the mother had not suffered too. Lately she had been getting very stout, and had had some of the signs and symptoms of gestation. The abdomen was as large as a seven months' pregnancy, but the bimanual examination discovered a uterus not bigger than a two months' pregnancy. There had been irregular bleedings, but the patient stated that in one of her previous pregnancies she had menstruated all the time. The case was a doubtful one till that morning, when Dr. Ballantyne found that the os was slightly open. He operated before the clinic, and removed from the uterus the remnants of the patient's twenty-fourth gestation sac. It had been an incomplete abortion. Another woman, also in the pre-maternity ward, was a patient who was sent in because she was thought to be suffering from hyperemesis gravidarum; she was certainly pregnant (at the sixth month); but her history and present signs and symptoms were carefully analysed, and the conclusion formed that it was a case of gastric ulcer complicating pregnancy. Medical treatment would be carried on for a few days, but it might be necessary to operate. Three other patients who had all been inmates of the pre-maternity ward were seen; one of them had had all the signs of impending eclampsia, but preventive treatment had been successful, and a living child had been born; another was brought in nearly moribund from acute anaemia at the seventh month, suffering from intense dyspnoea, hydrothorax, and dropsy; but tapping the pleural sacs, with appropriate medical treatment, had been instrumental in getting her safely over her labour, although the infant had died a few days later; the third patient had been the subject of acute hydramnios with a twin pregnancy at the sixth month, and it had been necessary to tap the membranes to give relief, but both the twins had perished, a result which Dr. Ballantyne said must be called a failure, although the infants were premature.

Correspondence.

THE BIONOMICS OF THE RAT-FLEA.

SIR,—With regard to the question of the longevity of the rat-flea when fasting—a point which I raised in your issue of May 31st last—may I make the following further remarks, in reply to Mr. Bacot's criticisms?[1]

Let us grant to Mr. Bacot that either larvae—resting larvae or pupae—existed in the flea-breeding rubbish in which I failed to find them; but if this *is* granted, how does he explain the fact that when I separated off small portions of this flea rubbish from the remainder and closely observed it for three to four months, there was no accession of adult fleas? There should have been, according to his hypothesis. I also examined carefully the flea rubbish, looking for pupae, and found none. Mr. Bacot has misunderstood my previous statement on this point. Of course, I found empty cocoon cases, but I was referring to full ones.

The evidence seemed conclusive that no accession of adult fleas was continually taking place, and therefore that all the adult fleas were there to start with, and that they lived for eighteen months without food. Mr. Bacot himself adduces evidence in favour of my hypothesis by showing how the insects, if allowed to bury themselves in moist sand, do live for very much longer than they would if put in a paper tube and buried under the same conditions. It is not difficult to imagine that in a hygroscopic stuff like "flea rubbish" the fleas could bury themselves deeply and survive for eighteen months.

Furthermore, Mr. Bacot does not assert that his larvae lived in the resting state more than four hundred days, which could not account for the production of fleas at the end of eighteen months, nor will it account for the well-known experience of finding fleas in houses which have been deserted for years. Also one would expect under Mr. Bacot's hypothesis that there would be a greater accession of adult fleas in the warmer months of the year, which is exactly the contrary of what I found, namely, a great decrease during the summer.

The resting larval state seems to be limited in duration when compared with the longevity of the adult when it has emerged. This is very great, I am convinced, and a continual accession of new adults did not play much part in my experiments.

Another point which proves absolutely that my original fleas lived as long as eighteen months is that I found *Trypanosoma lewisi* in several of them, derived from the rats on which I had fed the fleas eighteen months, or more, before.

It is rather an important question to decide from the point of view of disinfection and prevention[2] of plague, but I do not think Mr. Bacot's theory will fit all the facts. I will be pleased to fall in with him if it can be made to do so.—I am, etc.,

Kuala Lumpur,
July 17th.

C. STRICKLAND,
Travelling Medical Entomologist, F.M.S.

[1] BRITISH MEDICAL JOURNAL, June 14th, 1913, p. 1299.

NATHANIEL ALCOCK MEMORIAL FUND.

SIR,—It is considered by those who have known and appreciated the scientific work of the late Professor Nathaniel Alcock that some fitting tribute to his memory should be made.

Owing to his early death and the moderate remuneration that generally falls to the lot of the scientific worker, his family has been left wholly unprovided for. His widow has to face the upbringing and education of four young children, the eldest 7, the youngest 2 years of age, and it is thought that the most appropriate form such a memorial could take would be that of a fund to enable his three daughters and one son to receive an adequate education.

An appeal is accordingly made to the friends of the late Professor Alcock to contribute to a fund for the benefit of his widow and children.

Contributions will be gratefully received and acknowledged by Professor E. H. Starling, Physiological Institute, University College, London, W.C.; or Professor A. D. Waller, Physiological Laboratory, London University, South Kensington, London, S.W. Cheques should be drawn to the order of Professor E. H. Starling or Professor A. D. Waller, and crossed "Alcock Memorial Fund."—We are, etc.,

W. H. WILLCOX.
W. M. BAYLISS.
JOHN ROSE BRADFORD.
A. D. WALLER.
W. PETERSON.
E. H. STARLING.
F. O'B. ELLISON.

The Services.

MEDICAL AID IN THE FIELD.

COLONEL BULL'S SCHEME.

FOLLOWING upon an imaginary very severe cavalry conflict in the vicinity of Wolverton on July 19th, the largest demonstration of the manner in which the wounded would be succoured by the Territorial Forces and the Voluntary Aid Detachments ever given in the South Midlands was carried out. The whole scheme was, we learn from the *Northampton Daily Chronicle*, planned by, and effected under the supervision of, Colonel W. H. Bull, K.H.S., V.D., Assistant Director of Medical Services in the South Midland Division. The Royal Army Medical Corps and the Voluntary Aiders of the district took part in the

[2] I see that Dr. Swellengrebel has just proved that fleas do not remain infective for longer than twenty-eight days.

work, and the skilful manner in which they dealt with the complete scheme and overcame the difficulties it involved bore high testimony to their general efficiency. The country in which the imaginary battle took place was utilized to the best possible extent by Colonel Bull in his scheme. Colonel Bull's able staff included: Lieutenant-Colonel L. Haywood, Deputy Assistant Director (Colonel Bull's Staff Officer), Captain Bramhall, R.A.M.C. Adjutant; Colonel Burrows, C.M.G., County Director, Bucks; Lieutenant-Colonel Deyns, Commander of the 2nd South Midland Mounted Brigade Field Ambulance; Lieutenant-Colonel Howkins, Commander of the 1st S.Mid.F.A.; Captain Baker, M.B., Bucks Batt. Bucks and Oxon. Light Infantry; and Captain Moore, R.A.M.C.T. The following officers were on duty with the R.A.M.C.: Lieutenant-Colonel C. J. Deyns (Commanding), Captain A. M. Moore, Captain G. Buxton, Lieutenant Ed. Bull, together with Captain Bramhall, Adjutant from the Birmingham School of Instruction, with his sergeant-majors.

The Voluntary Aid Detachments present were Stony Stratford, Wolverton, and Wing (male and female), and Buckingham, Steeple Claydon, and Aylesbury (female) and Rugby. There were upwards of 180 members on duty, comprising 110 female nurses and 70 male members.

BIRMINGHAM UNITS, R.A.M.C.(T.F.).

A COMBINED church parade of all the Birmingham units was held at Great Brook Street Barracks on Sunday, July 27th, under the command of Lieutenant-Colonel F. Marsh. Before the service the troops marched from their head quarters through the city, and passed a saluting base at the General Hospital, where Colonel W. H. Bull, K.H.S., V.D., took the salute. The following units were on parade: First South Midland Mounted Brigade Field Ambulance, First South Midland Field Ambulance, Second South Midland Field Ambulance, First Southern General Hospital, North Midland Mounted Brigade Field Ambulance, two Voluntary Aid Detachments of the Birmingham Brigade St. John Ambulance Association, Coleshill Voluntary Aid Detachment, Smethwick Voluntary Aid Detachment, and West Bromwich Voluntary Aid Detachment.

Medical News.

A PASTEUR INSTITUTE has been established at St. Louis. It is a branch of the New York Institution. The director is Dr. L. Whitley.

IT is stated that the United States Public Health Service is about to establish a receiving station for sufferers from pellagra in Spartansburg, New Carolina.

ON August 7th a tablet, recording the place of birth of Sir William Turner, Principal of the University of Edinburgh, was unveiled in his native town of Lancaster.

HER MAJESTY QUEEN ALEXANDRA has become a Life Governor of the Royal Dental Hospital, Leicester Square, W.C., having allotted £200 from the Alexandra Day collection to that institution.

PROFESSOR A. VON WASSERMANN has been appointed head of the new Kaiser-Wilhelm Institute for Experimental Therapeutics, one of the laboratories established by the Kaiser-Wilhelm Society of Scientific Research.

A SPECIAL three-weeks' vacation course will commence at the West London Post-Graduate College on August 18th, the chief subjects dealt with during the first week being gynaecology, pediatrics, dermatology, and diseases of the eye, throat, nose, and ear.

AN International Congress on Help for the Wounded in War will be held at Ghent from August 15th to 30th, under the patronage of the King and Queen of Belgium. Particulars can be obtained on application to Dr. Jean Conrad, surgeon-in-chief to the civil hospitals of Antwerp. The treasurer is M. Albert de Meyer, 14, rue du Jardin, Antwerp.

A COMMITTEE for the investigation and prevention of cancer, with its head quarters in the University of Giessen, has been founded with the sanction of the Health Department of the Grand Duchy of Hesse-Darmstadt. At its inaugural meeting Professor Opitz delivered an address on the treatment of malignant disease with radium and mesothorium.

SIR JAMES GRANT, of Ottawa, Consulting Physician to the Governor-General of Canada, was made an honorary life member of the Canadian Medical Association at its meeting in June. Sir James Grant, who was born in 1831, has taken a prominent part in Canadian politics, and was President of the International Congress of Hygiene for Canada held in 1909. He was created K.C.M.G. in 1887. He was president of the Tuberculosis Association of Canada in 1901-2, and is ex-President of the Medical Council of Ontario.

Letters, Notes, and Answers.

ORIGINAL ARTICLES and LETTERS *forwarded for publication are understood to be offered to the* BRITISH MEDICAL JOURNAL *alone unless the contrary be stated.*

MANUSCRIPTS FORWARDED TO THE OFFICE OF THIS JOURNAL CANNOT UNDER ANY CIRCUMSTANCES BE RETURNED.

CORRESPONDENTS not answered are requested to look at the Notices to Correspondents of the following week.

AUTHORS desiring reprints of their articles published in the BRITISH MEDICAL JOURNAL are requested to communicate with the Office, 429, Strand, W.C., on receipt of proof.

TELEGRAPHIC ADDRESS.—The telegraphic address of the EDITOR of the BRITISH MEDICAL JOURNAL is *Aitiology, Westrand, London.* The telegraphic address of the BRITISH MEDICAL JOURNAL is *Articulate, Westrand, London.*

TELEPHONE (National):—
2631, Gerrard, EDITOR, BRITISH MEDICAL JOURNAL.
2630, Gerrard, BRITISH MEDICAL ASSOCIATION.
2634, Gerrard, MEDICAL SECRETARY.

☞ *Queries, answers, and communications relating to subjects to which special departments of the* BRITISH MEDICAL JOURNAL *are devoted will be found under their respective headings.*

QUERIES.

W. B. H. would like to know of any institution where a young man, a West Highland crofter, aged 21, could have treatment for stammering. At times he is quite unable to articulate, and has to write down what he wants to say. When alone he speaks quite freely.

ANSWERS.

A. H.—The cases referred to under Regulation 3 made under the Workmen's Compensation Act are the cases of industrial disease in the third schedule of the Act, including those diseases added by Order. Such diseases would come to the knowledge of the certifying factory surgeon when carrying out his duties under the Factory and Workshops Act. The duty is laid upon him to carry out periodical examinations and other duties, such as suspension, entry in health register, etc., imposed upon him by regulations and special rules which are in force for the industries and processes certified to be dangerous under Section 79. In this case the prescribed fees are smaller, because the surgeon is making his examination in the performance of his duty. The certificates must be in the prescribed form.

LETTERS, NOTES, ETC.

THE "MEDICAL DIRECTORY" FOR 1914.

M.B., B.C.CANTAB. writes to endorse the remarks of "F.R.C.S." in the JOURNAL of August 9th anent the curtailing of the record of past appointments in the *Medical Directory*. Granted that the insertion of these does increase its size, he thinks their omission will greatly diminish its utility.

M.B., Ch.B., etc., writes in the same sense.

FLEAS AND SULPHUR.

DR. FREDERIC C. EDGE (Birmingham) writes: Some years ago I wrote, and you kindly inserted, a note on the effect of sulphur in rendering my skin unpalatable to fleas. No doubt in the case of the skin the acrid hyposulphide fumes can be smelled, and I take it that these fumes cause irritation in the tracheae of the insect, and that it is not the insect's food which is rendered unpalatable, because the fleas will still bite my neck and exposed skin, but will not enter beneath my clothing, where the sulphurous fumes choke them.

SODIUM CARBONATE IN RINGWORM.

DR. HARRISON THOMAS (Taunton) writes: Since reading Dr. Nock's communication in the JOURNAL of March 8th, 1913, p. 498, recommending the use of fused washing soda in ringworm of the scalp, I have treated two cases in that manner with entire success. Both cases were in girls and were of some months' standing; one of them I treated with two dressings of the soda and the other with only one. This was about six weeks ago, and the hair is now apparently healthy, although rather thin in the places that were affected. The simplicity of the method and the ease of its application makes it very useful in the treatment of children in institutions.

SCALE OF CHARGES FOR ADVERTISEMENTS IN THE BRITISH MEDICAL JOURNAL.

	£	s.	d.
Seven lines and under	0	5	0
Each additional line	0	0	8
A whole column	3	10	0
A page	10	0	0

An average line contains six words.

All remittances by Post Office Orders must be made payable to the British Medical Association at the General Post Office, London. No responsibility will be accepted for any such remittance not so safeguarded.

Advertisements should be delivered, addressed to the Manager, 429, Strand, London, not later than the first post on Wednesday morning preceding publication, and, if not paid for at the time, should be accompanied by a reference.

NOTE.—It is against the rules of the Post Office to receive *poste restante* letters addressed either in initials or numbers.